Automotive Corporation

TC–170 & TC–170 PD
TRANSFER CASE

SERVICE MANUAL

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OPERATING INSTRUCTIONS

TC-170 Proportional Differential Transfer Case

DESCRIPTION:

The Fabco TC-170 series transfer case with proportional differential is a single-speed unit designed for full-time all wheel drive chassis.

AIR ACTUATED TRANSFER CASE DIFFERENTIAL LOCK:

For normal operation, leave the transfer case differential control in the unlocked position.

In poor traction conditions, the transfer case differential control may be shifted to the locked position. The transfer case differential lock can be engaged while the chassis is stationary, or at any speed, provided the axles are not spinning out.

CHASSIS DYNAMOMETER OPERATION:

When testing any chassis equipped with a Proportional Differential Transfer Case it is necessary to disconnect the front driveline at the transfer case and the transfer case differential lock must be engaged.

WARNING: The above instructions must be followed because this transfer case is not designed for continuous operation with the rear wheels turning and the front wheels stationary. Excessive speeding of the internal differential parts will occur if these instructions are not observed.

TOWING:

When towing any chassis equipped with a Proportional Differential Transfer Case, disconnect and remove both front and rear drivelines before moving chassis.

SERVICE & PARTS MANUAL

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I. LUBRICATION

RECOMMENDED LUBRICANTS

On-Highway Vehicles

1. Heavy-duty Engine Oil:

Temperature	Grade
Above + 10° F	SAE 50
Below + 10° F	SAE 30

Be sure to specify heavy-duty type meeting MIL-L-2104B specifications.

2. Mineral Gear Oil:

Temperature	Grade
Above + 10° F	SAE 90
Below + 10° F	SAE 80

Must be inhibited against corrosion, oxidation, and foam.

3. MIL-L-2105B E.P. Oil, except sulfur-chlorine-lead type:

Temperature	Grade
Above + 10° F	SAE 90
Below + 10° F	SAE 80

Extreme pressure oils under some conditions might form carbon deposits on gears, shafts, and bearings, which will result in transfer case malfunctions and premature failure. It is suggested that if these conditions exist, and E.P. oil is being used, a change should be made to mineral gear oil or heavy-duty engine oil as recommended.

Off-Highway & Mining Equipment

1. Heavy-duty Engine Oil:

Temperature	Grade
Above + 10° F	SAE 50
Below + 10° F	SAE 30

Be sure to specify heavy-duty type meeting MIL-L-2104B specifications.

2. Special Recommendation: For extreme cold weather where temperature is consistently below 0° F, use SAE 20W heavy-duty engine oil meeting MIL-L-2104B specifications.

OIL CHANGE

The transfer case lubricant should be changed on all new transfer cases after the first 3,000 to 5,000 miles (on-highway), or the first 40 hours (off-highway); thereafter oil changes should be done at the following intervals:

On-Highway Service ..... 10,000 – 15,000 Miles

Off-Highway Service (Logging, dirt moving, mining, and associated operations)..... .... 500 – 750 Hours

The recommended oil change and inspection periods are based on the average use and operating conditions that the unit may encounter. It is suggested that the individual owner make a periodic lab analysis of the lubricant to determine contamination based on the unit's specific operating conditions. With this data, the oil change and inspection periods can be better determined.

DRAINING THE OIL

Draining is best accomplished after the vehicle has been operated briefly, allowing the oil to become warm and flow more freely. Remove both drain and fill plugs. Allow the housing to empty completely. Before the unit is refilled, it should be thoroughly flushed with clean flushing oil or kerosene.

If the unit is equipped with an oil pump, the lube oil filter should be replaced whenever the oil is changed. The element is of the spin-on type. A film of clean oil should be applied to the rubber gasket of the new element before installing. Do not over tighten.

REFILLING THE OIL

If the transfer case has been removed from the vehicle for service, it is best to refill the oil after the unit has been reinstalled into the vehicle.

Clean and replace the drain plug and fill the transfer case with the appropriate oil with the vehicle on level ground. Fill the transfer case to the level of the fill plug. On transfer cases equipped with a proportional differential, it may take some time for the oil to flow into the main housing; therefore, it is necessary to fill the unit to the level of the fill plug, wait a few minutes, and top off the oil level. It may be necessary to do this several times. The plug should be installed only after the oil level has stabilized.

The approximate oil quantity is 6.5 quarts. The exact amount will vary somewhat, depending on the model and the inclination of the unit; therefore, always fill to the level of the fill plug. Do not overfill. Inspect for leaks.

INSPECTION

The oil is to be maintained at the level of the fill plug at all times. Check at the following intervals:

Highway Service ..... 1,000 Miles

Off-Highway Service ..... 40 Hours

With every oil change, the shift cylinder air lines and valves should be inspected for leaks and possible malfunctioning. Low pressure conditions can cause partial clutch engagement which may result in premature wear or damage.

II. DISASSEMBLY

PRELIMINARY STEPS

1. After removing the transfer case for the vehicle thoroughly clean the exterior.
2. Remove the drain plug and drain the oil.
3. Mount the transfer case in a suitable fixture. The fixture should be such that the transfer case can be rotated so that either the front of the rear of the case is facing upward. A transfer case mounted in a typical fixture is shown in Figure 1.

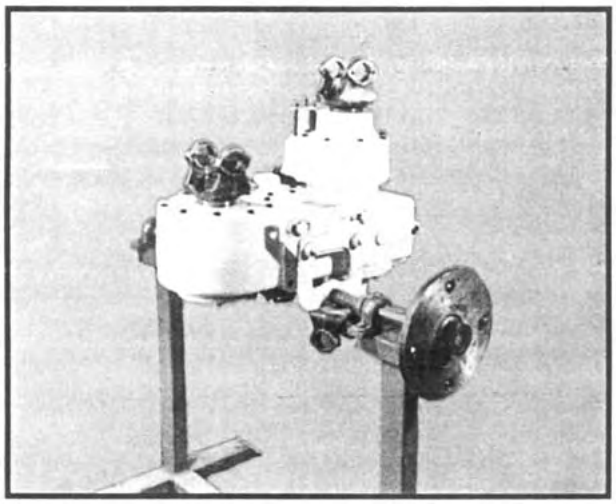

Fig 1

4. If so equipped, remove the lubrication lines and oil filter. **Note the location and routing of the lines so that they may be correctly reinstalled.**

TRANSFER CASE COMPONENT REMOVAL

For purposes of this manual, all basic TC-170 transfer cases contain four shaft assemblies. Upper, Intermediate, Front Output, and Rear Output. See Figures 2 and 3. The TC-170 PD (Proportional Differential) models contain three shaft assemblies: Upper, Intermediate, and Lower. See Figure 4. There are various versions of each shaft assembly, depending on the particular model transfer case being worked on. Be sure to use the correct procedure for each shaft assembly. In some procedures, a similar procedure for a different shaft is called out.

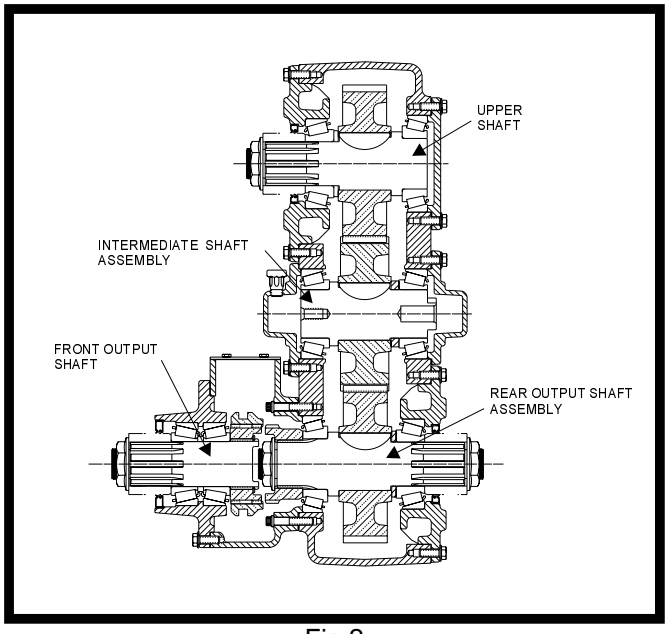

Fig 2

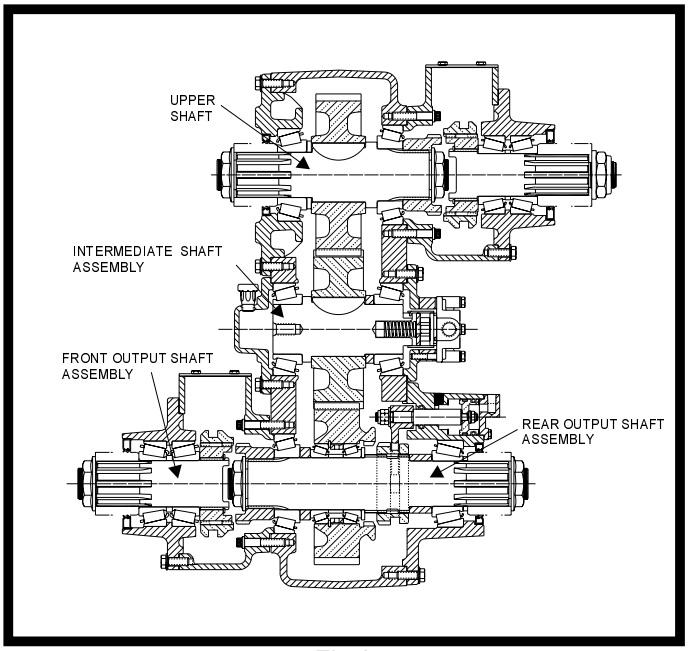

Fig 3

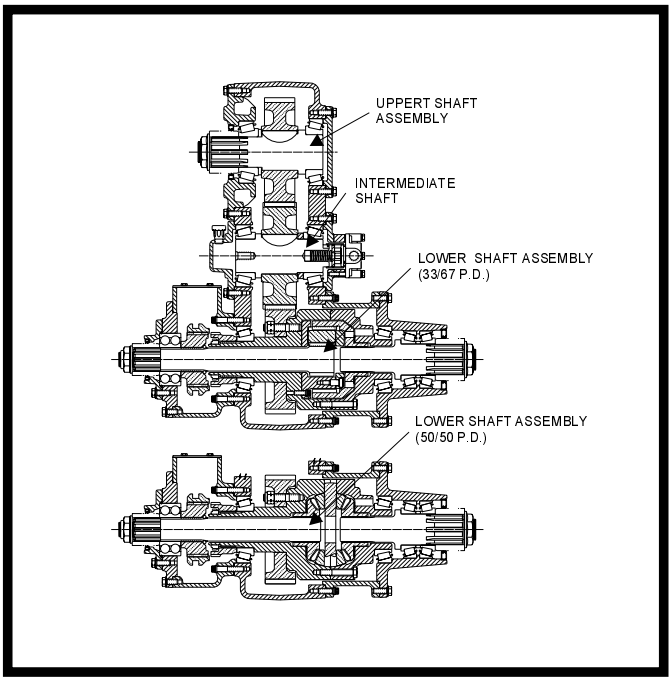

Fig 4

UPPER SHAFT REMOVAL – MODELS WITHOUT PTO OR HYDRAULIC PUMP OUTPUT

Refer to Figure P.5 in the parts manual.

1. Position the transfer case with its front end (nameplate) facing upward.
2. Remove the (10) cap screws and washers securing the front carrier to the transfer case housing. See Figure 5.

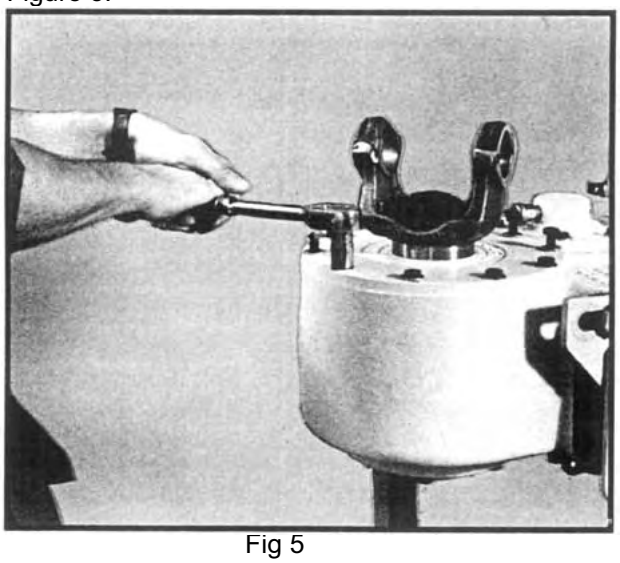

Fig 5

3. Remove the upper shaft assembly from the transfer case by lifting on the shaft yoke. Discard the gasket.
4. Rotate the transfer case over so that the rear end is upward.
5. Remove the (6) cap screws and washers securing the rear cap to the transfer case housing. Remove the cap, shim pack, and rear bearing cup. Keep the shims together with the cap to facilitate reassembly.

UPPER SHAFT REMOVAL – MODELS WITH PTO OUTPUT

Refer to Figures P.6 and P.15 in the parts manual.

1. Follow Steps 1 through 4 under “UPPER SHAFT REMOVAL – MODELS WITHOUT PTO OR HYDRAULIC PUMP OUTPUT” above
2. To remove the PTO unit, follow the similar procedure in Steps 2 through 10 under “FRONT OUTPUT SHAFT REMOVAL” below.

UPPER SHAFT REMOVAL – MODELS WITH HYDRAULIC PUMP OUTPUT

Refer to Figures P.7 and P.15 in the parts manual

1. Follow Steps 1 through 4 under “UPPER SHAFT REMOVAL – MODELS WITHOUT PTO OR HYDRAULIC PUMP OUTPUT” above
2. To remove the pump declutch unit, follow the similar procedure in Steps 2 through 4 under “FRONT OUTPUT SHAFT REMOVAL” below.
3. Remove the (8) cap screws and washers securing the hydraulic pump mounting plate and lift off the plate and pump as an assembly.
4. Continue removing the pump declutch unit by following the similar procedure in Steps 6 through 10 under “FRONT OUTPUT SHAFT REMOVAL” below.

REAR OUTPUT SHAFT REMOVAL

Refer to figure P.12 in the parts manual if the lower shaft has neutral provision; Figure P.11 if not.

1. Position the transfer case with its rear end facing upward.
2. Remove the (10) cap screws and washers securing the rear output carrier to the transfer case housing. See Figure 6.

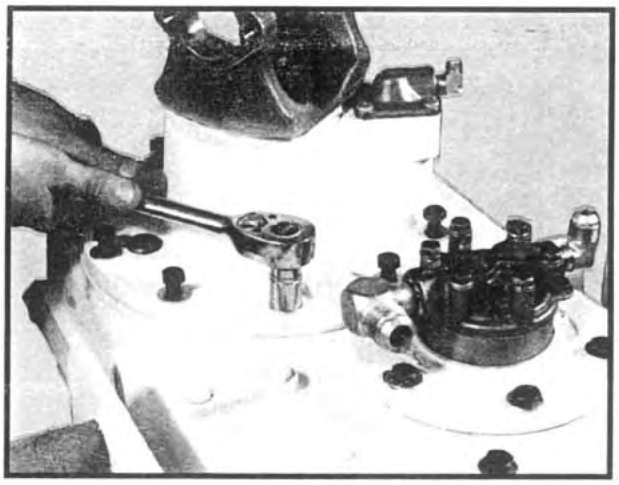

Fig 6

3. Remove the carrier and shaft assembly by lifting on the shaft yoke. Discard the gasket.

FRONT OUTPUT SHAFT REMOVAL

Refer to Figures P.10 and P.15 in the parts manual.

1. Position the transfer case with its front end facing upward.
2. Remove the indicator light switch and washer. Remove the switch actuating pin with a magnet.
3. Remove the (4) cap screws securing the air shift cylinder cap. See Figure 7. Lift off the cylinder and cap.

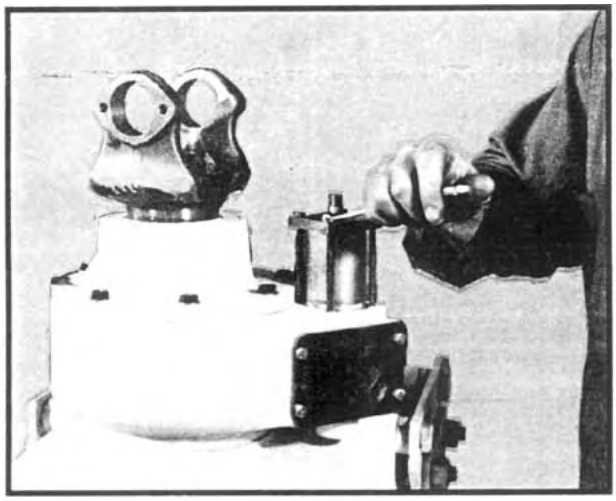

Fig 7

4. Remove the (4) cap screws securing the declutch housing cover plate. See Figure 8. Remove the cover plate and discard the gasket.

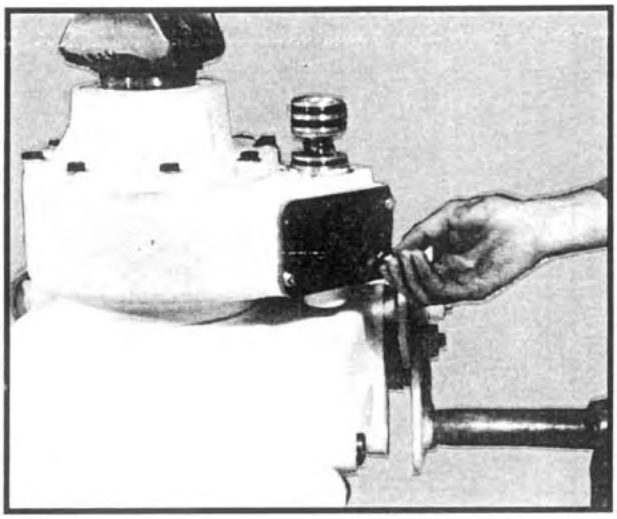

Fig 8

5. Remove the (8) cap screws and washers securing the carrier to the declutch housing.
6. Lift off the shaft assembly. Discard the carrier gasket.
7. Remove the air shift piston nut. Exercise caution as the piston is spring loaded. Remove the washer, piston, spring, and the nylon stop ring.
8. Cut and remove the safety wire on the shift fork bolts and remove the bolts. Remove the shift shaft. It may be necessary to carefully pry open slightly the slot in the shift fork to free the shaft. Lift out the shift collar and the shift fork.
9. Remove the (6) 12-point cap screws securing the declutch housing to the transfer case housing. Lift off the declutch housing and the shim pack. Keep the shims together with the housing to facilitate reassembly. Remove the bearing cup from the transfer case housing.
10. Do not remove the welch plug from the shift shaft bore in the declutch housing unless necessary.

LOWER SHAFT REMOVAL – MODELS WITH PROPORTIONAL DIFFERENTIAL

Refer to Figure P.13 in the parts manual if unit is equipped with 33/67 proportional differential; Figure P.14 if 50/50. Refer to Figure P.15 for the air shift cylinder details.

1. Position the transfer case with its front end facing upward.
2. Remove the front output yoke (or companion flange) retaining locknut and washer. Slip off the yoke (or flange).

3. Remove the (6) cap screws and washers that secure the oil seal carrier to the front bearing carrier. See Figure 9. Lift off the seal carrier and discard the gasket.

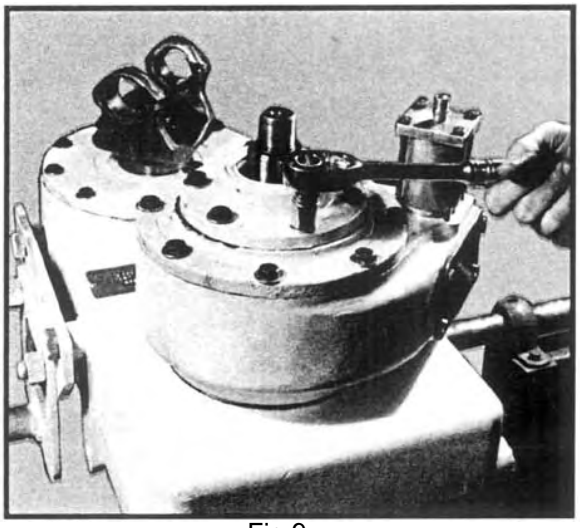

Fig 9

4. Remove the (8) cap screws and washers that secure the bearing carrier to the differential lockout housing. Lift off the bearing carrier (including the ball bearing assembly). Discard the gasket.

5. Remove the indicator light switch and washer. Remove the switch actuating pin with a magnet.

6. Remove the (4) cap screws securing the air shift cylinder cap. Lift off the cylinder and cap.

7. Remove the (4) cap screws securing the lockout housing cover plate. Remove the cover plate and discard the gasket.

8. Remove the air shift piston nut. Exercise caution as the piston is spring loaded. Remove the washer, piston, spring, and nylon stop ring.

9. Cut and remove the bolts. Remove the shift shaft. It may be necessary to carefully pry open slightly the slot in the shift fork to free the shaft. Lift out the shift collar and the shift fork. Slide out the clutch gear.

10. On models with the 50/50 proportional differential only, lift out the front output shaft. Do not remove the retaining ring from the shaft unless it or the shaft is to be replaced.

11. Rotate the transfer case over so that its rear end is facing upward.

12. Remove the (10) 12-point cap screws securing the outer differential housing to the transfer case housing. See Figure 10. Lift off the rear output carrier and shaft assembly and set aside. Discard the gasket.

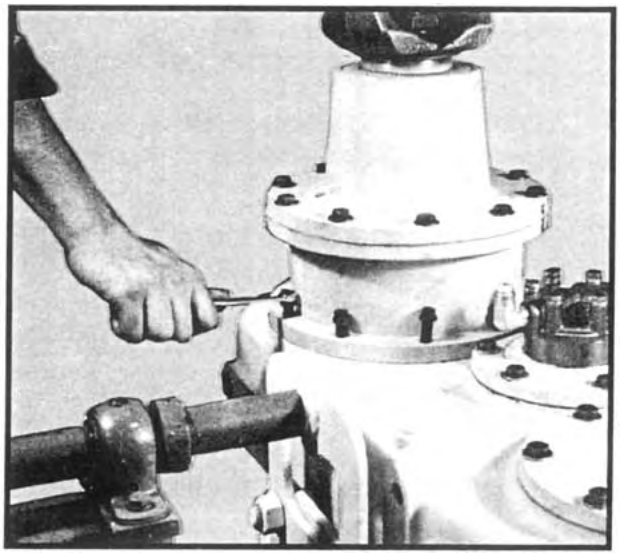

Fig 10

13. Lift out the lower shaft assembly. See Figure 11. A chain may be attached to the assembly by installing two “L” brackets under two opposing differential case half bolt heads.

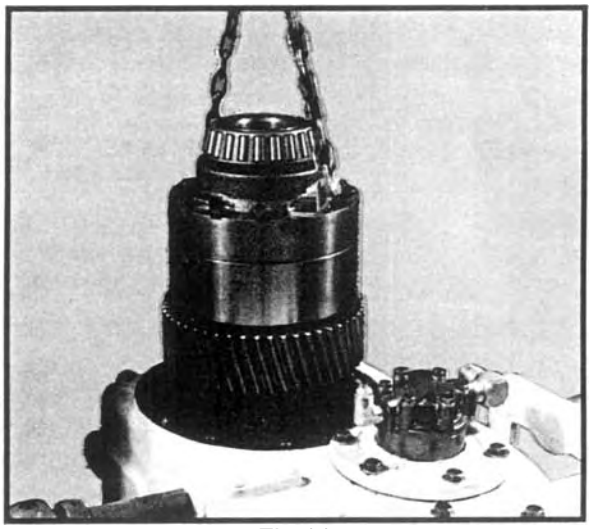

Fig 11

14. Rotate the transfer case over so that its front end is facing upward.

15. Remove the (6) 12-point cap screws securing the differential lockout housing to the transfer case housing. Lift off the lockout housing and the shim pack. Keep the shims together with the housing to facilitate reassembly. Remove the bearing cup from the transfer case housing.

16. Do not remove the welch plug from the shift shaft bore in the lockout housing unless necessary.

INTERMEDIATE SHAFT REMOVAL

If the unit is equipped with a lubrication pump, refer to Figure P.9 in the parts manual. If not, refer to Figure P.8.

On Models not equipped with a lubrication pump, begin the procedure at Step 4.

1. Position the transfer case with its rear end facing upward.

2. Remove the (6) cap screws and washers securing the oil pump cap. See Figure 12. Lift off the cap, shims, oil pump ring, and gasket. Discard the gasket.

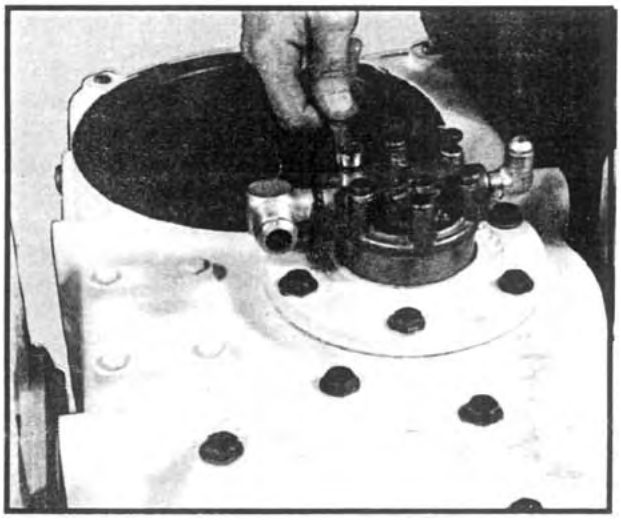

Fig 12

3. Remove the oil pump cartridge and spring by lifting from the shaft.

4. Position the transfer case with its front end facing upward.

5. Remove the (6) cap screws and washers securing the front intermediate cap. Remove the cap and discard the gasket.

6. Remove the front bearing cup by pulling upwards on the intermediate shaft assembly.

7. The gear and the rear bearing cone both have a press fit to the intermediate shaft. Therefore, a puller will be necessary to remove the shaft if damage is to be avoided. A sketch depicting a suitable fabricated puller is illustrated in Figure 13. Note that there are two shaft designs in use. The first production version uses a 5/8-11 threaded puller hole while later shafts have a 3/4-16 hole. Use the appropriate size threaded rod.

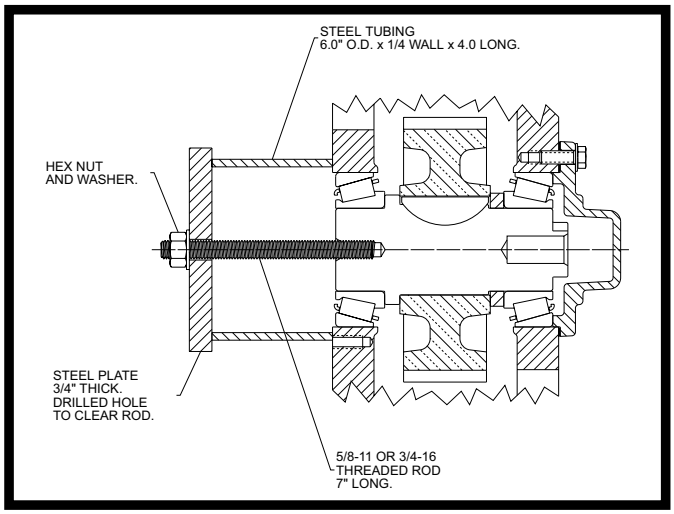

Fig 13

8. To prevent damage, do not allow the bearing cone assembly or the gear to drop inside the case as the shaft is being pulled out. See Figure 14. Remove the shaft, gear, spacer, and bearing cone assembly.

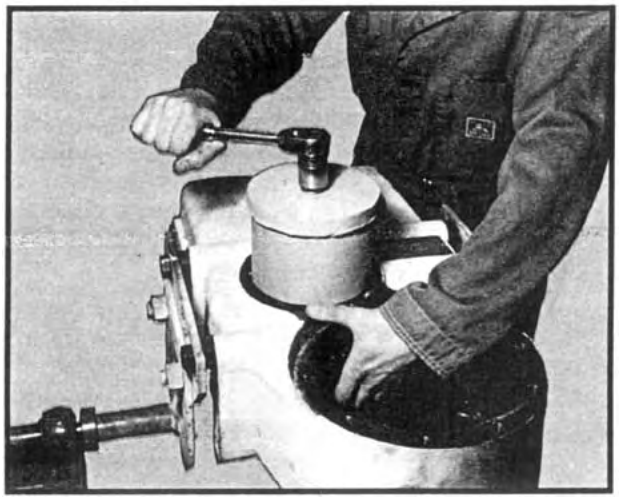

Fig 14

9. Rotate the transfer case over so that its rear end is facing upward.

10. Remove the (6) cap screws and washers securing the rear cap to the transfer case. Remove the cap, shim pack, and rear bearing cup. Keep the shims together with the cap to facilitate reassembly.

This concludes the general disassembly of the transfer case.

SUBASSEMBLIES

During a normal overhaul, it is neither necessary nor desirable to completely disassemble the shaft assemblies. The bearing cone assemblies and the drive train gears are installed with a press fit to the shaft and their unnecessary removal only increases the likelihood of damage. The same applies to the bearing cups installed in the carriers.

Parts should be cleaned with emulsion cleaners or petroleum solvents. To avoid damage, alkaline solutions should not be used.

UPPER SHAFT DISASSEMBLY – MODELS WITHOUT PTO OR HYDRAULIC PUMP OUTPUT

Refer to Figure P.5 in the parts manual.

1. Remove the yoke (or companion flange) retaining locknut with an impact wrench. Slide the yoke (or flange) off the shaft.

2. Lift off the carrier assembly. Remove the oil seal from the carrier and discard. Remove the bearing cup from the carrier only if it is to be replaced.

   It is not necessary to disassemble the shaft assembly any further unless one or more of the components remaining are to be replaced.

3. Place the shaft assembly in a press so that the rear of the gear is supported and the press arbor bears against the threaded end of the shaft. See Figure 15. Remove the front bearing cone assembly, the spacer washer, and the gear.

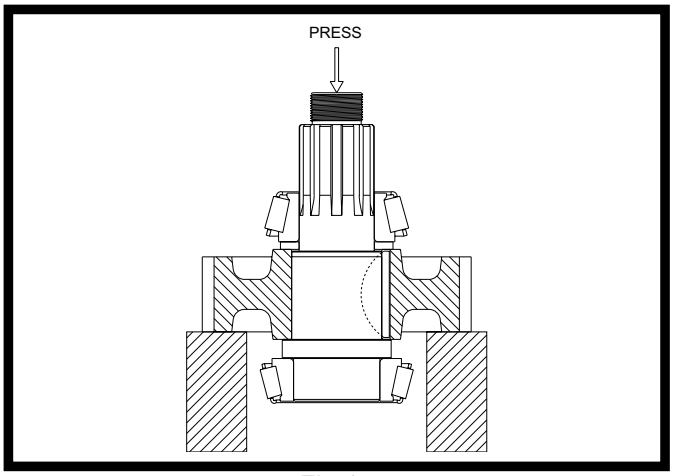

Fig 15

4. To remove the rear bearing cone assembly, support under the cone with a bearing separator and press the shaft through the cone. See Figure 16. Remove the shaft key only if necessary.

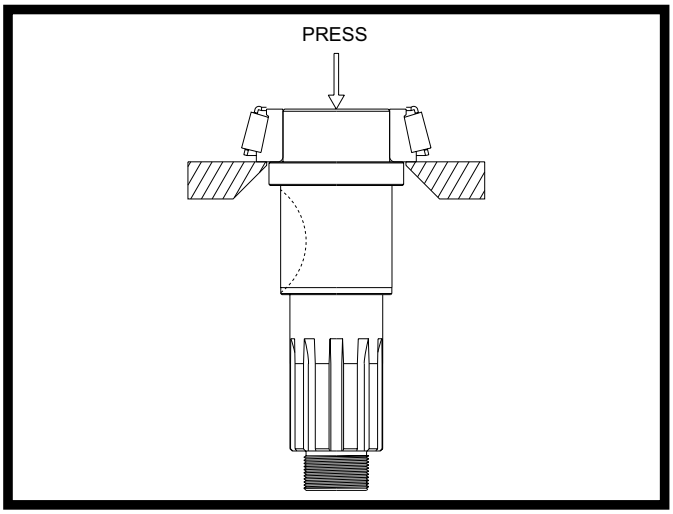

Fig 16

UPPER SHAFT DISASSEMBLY – MODELS WITH PTO OUTPUT

Refer to Figure P.6 in the parts manual.

1. Follow the similar procedure in Steps 1 through 5 under “REAR OUTPUT SHAFT DISASSEMBLY – MODELS WITHOUT NEUTRAL” below.

2. To disassemble the PTO output shaft assembly, follow the similar procedure under “FRONT OUTPUT SHAFT DISASSEMBLY” below.

UPPER SHAFT DISASSEMBLY – MODELS WITH HYDRAULIC PUMP OUTPUT

Refer to Figure P.7 in the parts manual.

Follow the similar procedure in Steps 1 through 5 under “REAR OUTPUT SHAFT DISASSEMBLY – MODELS WITHOUT NEUTRAL” below.

INTERMEDIATE SHAFT DISASSEMBLY

Refer to Figure P.9 in the parts manual if unit is equipped with a lubrication pump; if not see Figure P.8.

It is not necessary to disassemble the intermediate shaft assembly unless a component is to be replaced.

1. To remove the bearing cone assembly, support under the cone with a bearing separator and press the shaft through the cone. See Figure 17.

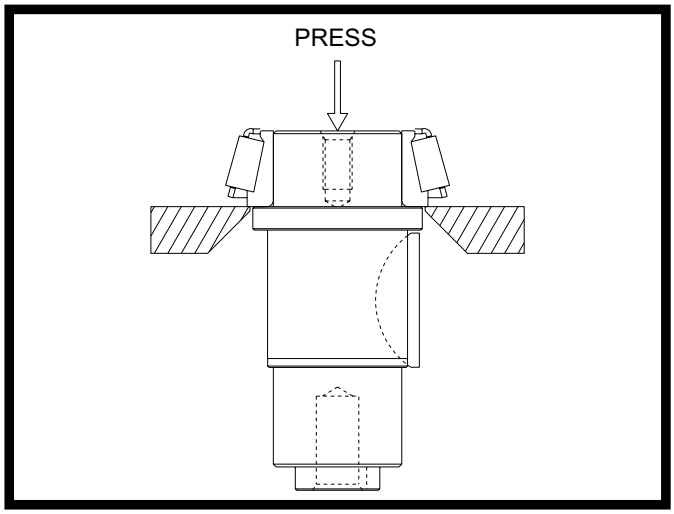

Fig 17

2. Remove the shaft key only if necessary.

FRONT OUTPUT SHAFT DISASSEMBLY

Refer to Figure P.10 in the parts manual.

1. To facilitate reassembly, the end float of the shaft should be checked prior to disassembly. Install a dial indicator with a magnetic base as pictured in Figure 18. Lift upward on the carrier and note the amount of end float.

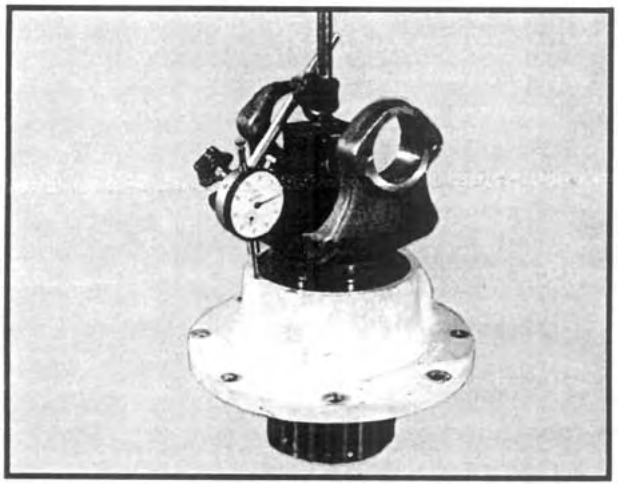

Fig 18

2. Remove the yoke (or companion flange) retaining locknut with an impact wrench. Slide the yoke (or flange) off the shaft.

3. Place the shaft assembly in a press such that the face of the clutch gear is supported and the press arbor bears against the threaded end of the shaft. See Figure 19. Be sure that the outer diameter of the snap ring will clear the support. Remove the carrier assembly, the inner bearing cone assembly, the bearing spacer ring, and the clutch gear.

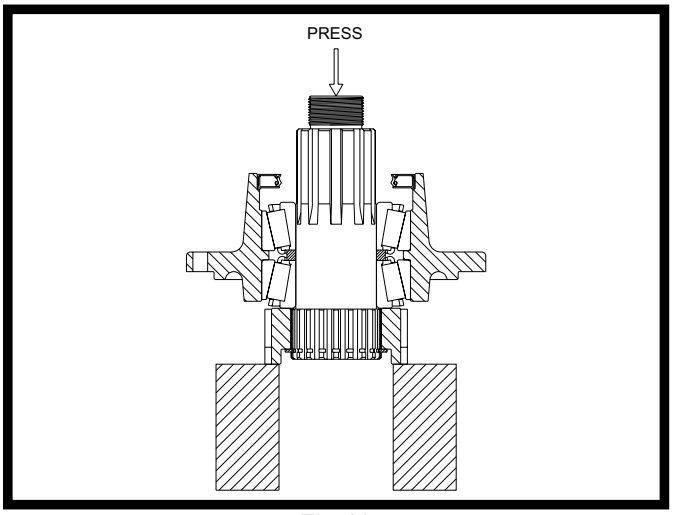

Fig 19

4. Remove the oil seal from the carrier and discard. Lift out the remaining bearing cone assembly. Remove the bearing cups from the carrier only if they are to be replaced.

5. Remove the snap ring from the shaft only if it or the shaft is to be replaced.

REAR OUTPUT SHAFT DISASSEMBLY – MODELS WITHOUT NEUTRAL

Refer to Figure P.11 in the parts manual.

1. Remove the yoke (or companion flange) locknut with an impact wrench. Slide the yoke (or flange) off the shaft.

2. Lift off the carrier assembly. Remove the oil seal from the carrier and discard. Remove the bearing cup from the carrier only if it is to be replaced.

3. Remove the clutch gear retaining locknut with an impact wrench. See Figure 20. Slide off the clutch gear.

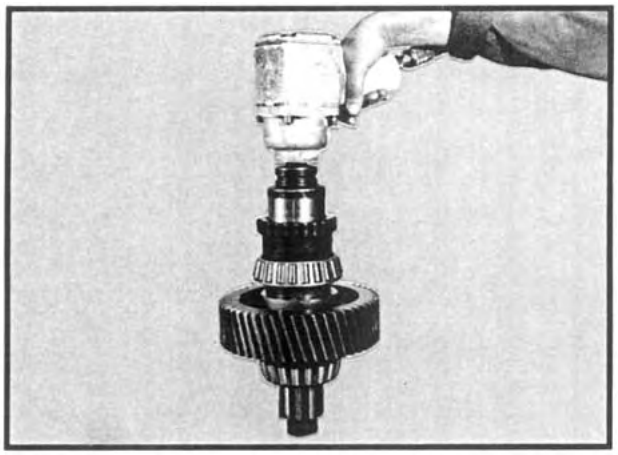

Fig 20

Steps 4 and 5 are necessary only if one or more components remaining are to be replaced.

4. Place the shaft assembly in a press so that the gear is supported and the press arbor bears against the yoke-end of the shaft. See Figure 21. Remove the bearing cone assembly, the spacer washer, and the gear. Remove the shaft key only if necessary.

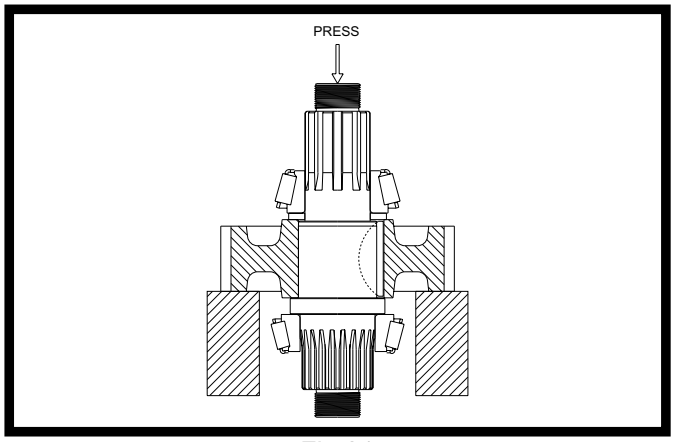

Fig 21

5. To remove the remaining bearing cone assembly, support under the cone with a bearing separator and press the shaft through the cone. See Figure 22.

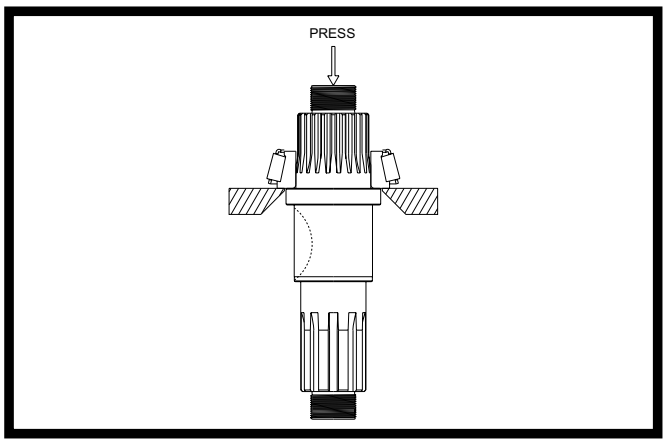

Fig 22

REAR OUTPUT SHAFT DISASSEMBLY – MODELS WITH NEUTRAL

Refer to Figure P.12 in the parts manual.

1. Remove the yoke (or companion flange) retaining locknut with an impact wrench. Slide the yoke (or flange) and the spacer ring off the shaft.

2. Remove the (4) cap screws securing the shift cylinder cap to the carrier. Remove the cap and the nylon piston stop ring. Discard the cap O-ring.

3. Remove the piston retaining locknut and washer. A wrench on the shift fork unit may be necessary to prevent the shaft from turning. See Figure 23.

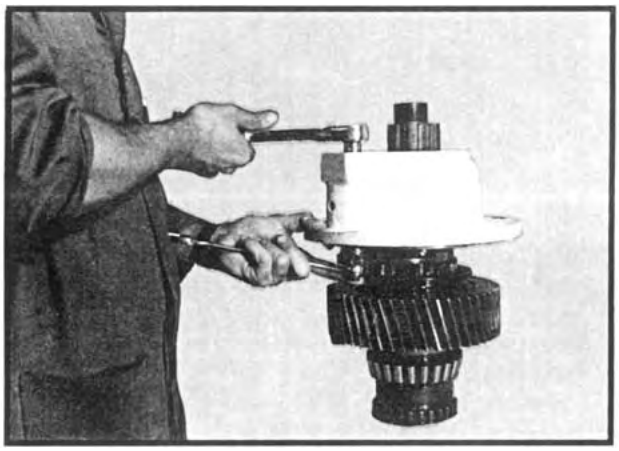

Fig 23

4. Lift the carrier assembly off the shaft and slide the shift fork from the clutch gear.

5. Remove the piston and the nylon stop ring from the carrier. Discard all O-rings. Remove the oil seal from the carrier and discard.

6. To facilitate reassembly, the gear end float on the shaft should be checked prior to further disassembly. Install a dial indicator with a magnetic base as pictured in Figure 24. Lift upward on the gear and note the amount of end float

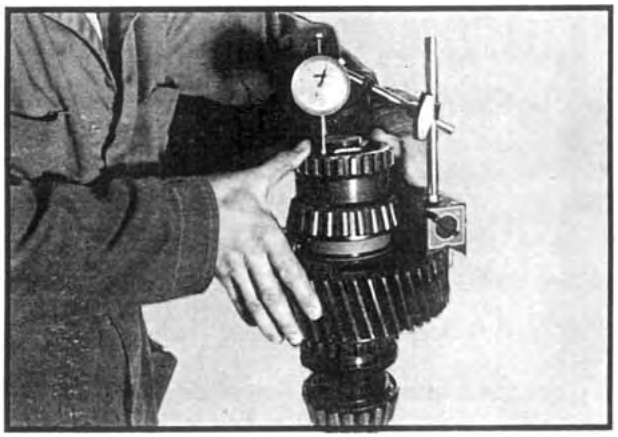

Fig 24

7. Remove the clutch gear retaining locknut with an impact wrench. See Figure 25. Slide the clutch gear off the shaft.

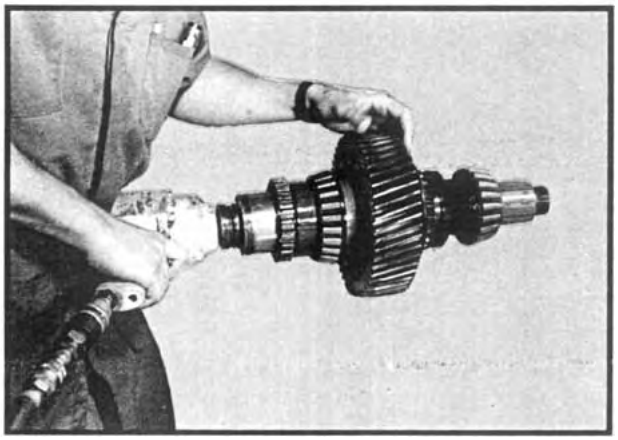

Fig 25

8. Engage the sliding clutch gear into the larger gear and position the assembly in a press such that the exposed face of the clutch gear is supporting and the press arbor bears against the opposite end of the shaft. See Figure 26. Remove the (3) bearing cone assemblies, the gear, the clutch gear, and the various spacers.

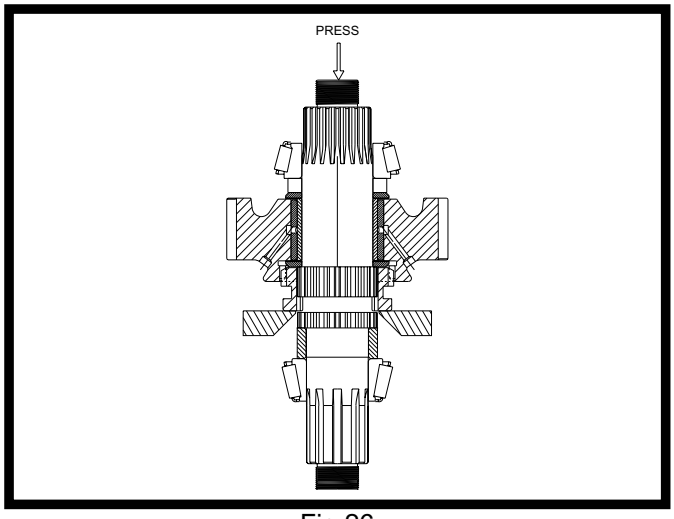

Fig 26

9. It is not necessary to remove the remaining bearing cone assembly unless it is to be replaced. If so, proceed as follows. Slip the clutch gear into place on the shaft against the spacer ring. Place the assembly in a press such that the face of the clutch gear opposite the ring is supported and the press arbor bears against the end of the shaft nearest the bearing. See Figure 27. Remove the bearing cone assembly and the ring.

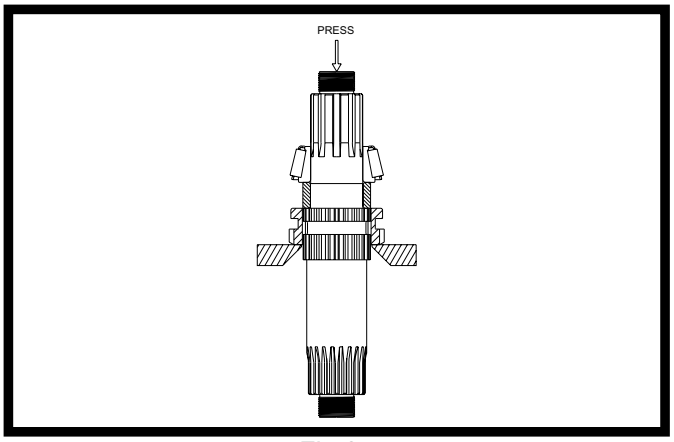

Fig 27

10. Do not remove the bearing cups from the gear unless replacement is necessary since the removal procedure may damage them or their spacer. To remove the cups, place the gear on a work surface with the internal clutch splines downward. With a hammer and punch, tap at the edges of the holes in the spacer to drive the lower cup from the gear. Turn the gear over, remove the snap ring, and press the remaining bearing cup from the gear.

LOWER SHAFT DISASSEMBLY – MODELS WITH 33/67 PROPORTIONAL DIFFERENTIAL

Refer to Figure P.13 in the parts manual.

1. Remove the retaining ring from the front output shaft. See Figure 28

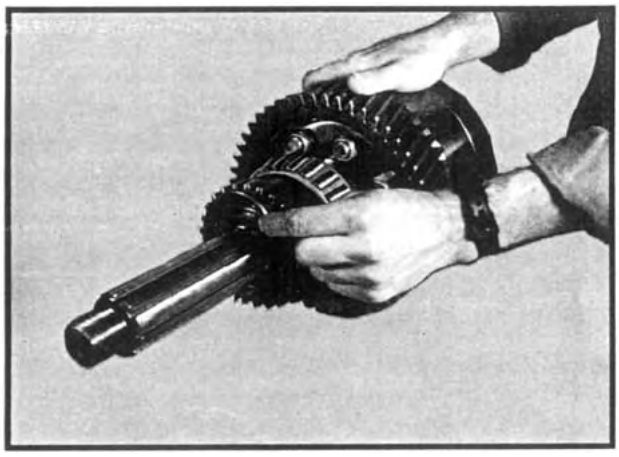

Fig 28

2. Remove the (12) bolts and separate the differential case halves. Remove the internal gear and thrust washer.

3. Remove the (6) 12-point cap screws securing the planet carrier to the front differential case. See Figure 29. Remove the planet carrier and sun gear assembly from the differential case assembly. Be careful not to lose the (2) dowel pins.

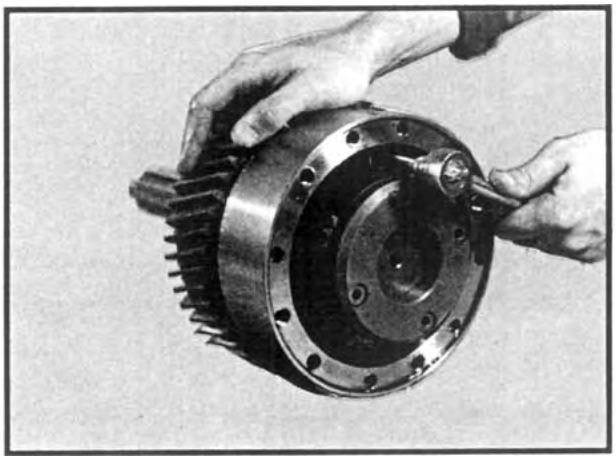

Fig 29

4. Remove the (4) allen-head screws securing the planet carrier cover plate to the planet carrier. See Figure 30. Remove the cover plate and lift out the (4) planet gears. Guide the sun gear (front output shaft) out of the planet gear.

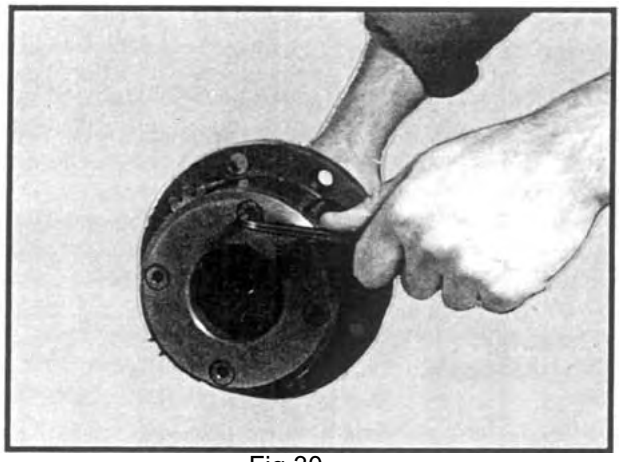

Fig 30

5. Remove the clutch gear retaining locknut from the front differential case half with Fabco tool 866-0368 or equivalent. See Figure 31. Slide off the clutch gear.

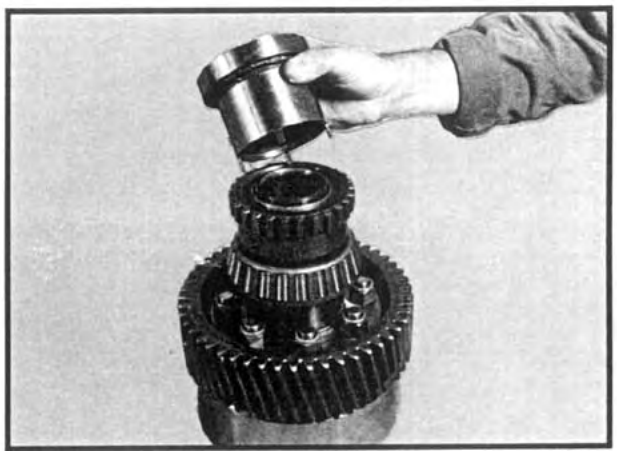

Fig 31

Perform Steps 6 and 7 only if necessary.

6. To remove the front bearing cone assembly, remove the (8) locknuts securing the gear to the front differential case half. Place this assembly in a press such that the gear is supported. See Figure 32. Press the bearing cone assembly and the gear from the case.

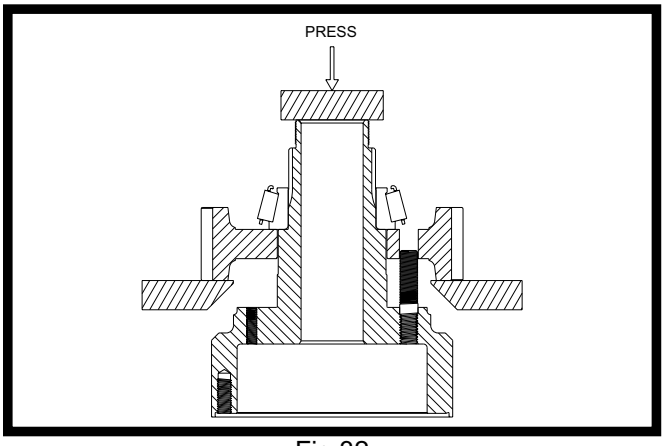

Fig 32

7. Place the rear differential case half assembly in a press such that the bearing cone is supported by a bearing separator plate. See Figure 33. Press the bearing cone assembly from the case.

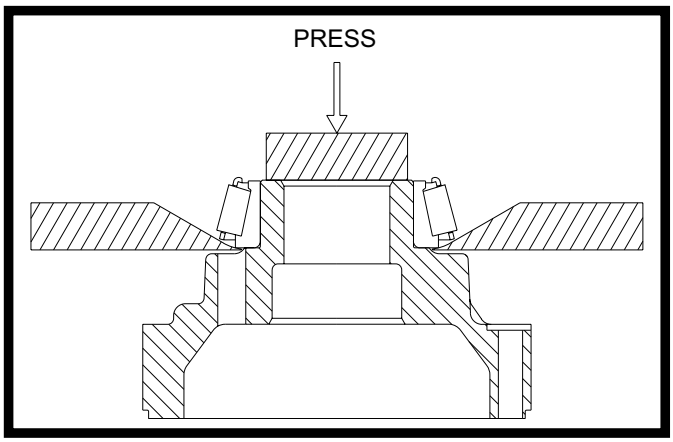

Fig 33

The disassembly procedure for the rear output shaft assembly follows.

8. Remove the (10) cap screws and washers fastening the rear carrier to the outer differential housing. See figure 34. Separate the carrier from the housing. Discard the gasket.

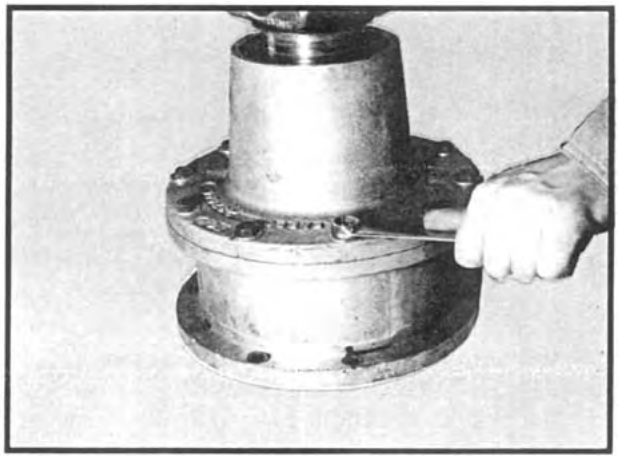

Fig 34

9. To facilitate reassembly, the end float of the rear output shaft should be checked prior to further disassembly. Install a dial indicator with a magnetic base as pictured in Figure 35. Lift upward on the carrier and note the amount of end float.

Fig 35

10. Remove the yoke (or companion flange) locknut with an impact wrench and slide the yoke (or flange) off the shaft.

11. Place the assembly in a press as depicted in Figure 36. Note that a fabricated spacer tube is required. Press the shaft through and remove the inner bearing cone assembly, the spacer washer, and the carrier assembly from the shaft.

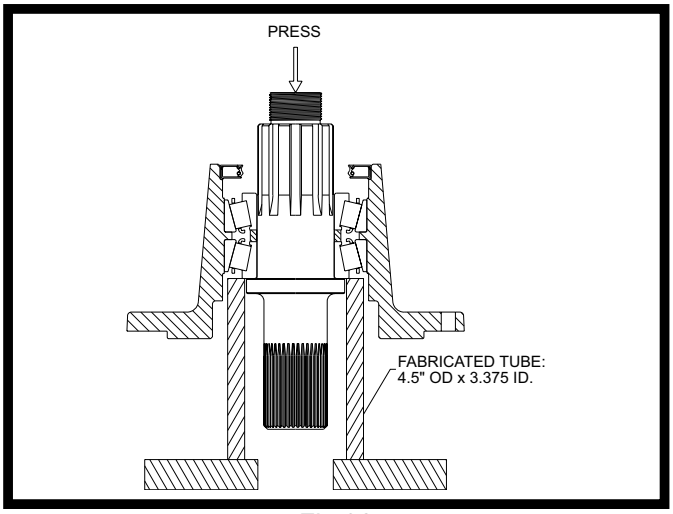

Fig 36

12. Remove the oil seal from the carrier and discard. Lift out the remaining bearing cone assembly. Remove the bearing cups from the carrier only if they are to be replaced.

LOWER SHAFT DISASSEMBLY – MODELS WITH 50/50 PROPORTIONAL DIFFERENTIAL

Refer to Figure P.14 in the parts manual.

1. Remove the (12) bolts and separate the differential case halves. Lift out the differential spider cross including the (4) pinion gears and their thrust washers. Remove the (2) side gears and thrust washers from the differential case halves.

Remove the bearing cone assemblies from the differential case halves only if replacing them. Refer to Steps 6 and 7 under "LOWER SHAFT DISASSEMBLY – MODELS WITH 33/67 PROPORTIONAL DIFFERENTIAL" above.

2. Refer to Steps 8 through 12 under "LOWER SHAFT DISASSEMBLY – MODELS WITH 33/67 PROPORTIONAL DIFFERENTIAL" above for disassembly of the rear output shaft assembly.

III. CLEANING AND INSPECTION

CLEANING

Steam may be used for external cleaning of completely assembled units. Care must be taken to ensure that water is kept out of the assembly by sealing breather caps and other openings.

The transfer case housing, which is too large to conveniently clean with solvents, may be immersed in a hot solution tank containing a mild alkaline solution. Aluminum parts such as the carriers, caps, declutch housing, and air shift cylinder components must never be cleaned in any type of alkaline solution. Parts cleaned in a hot solution tank must be rinsed thoroughly to prevent damage by traces of alkaline material.

Parts with ground or polished surfaces, such as bearings, gears, shafts, and oil pump components should be cleaned with emulsion cleaners or petroleum solvents. An alkaline solution may damage the machined surfaces and such cleaning methods should be avoided

DRYING AND CORROSION INHIBITION

Dry compressed air or clean, soft shop towels should be used to dry parts after cleaning. Bearings should never be spun dry with compressed air.

Dried parts should be immediately coated with a light oil or corrosion inhibitor to prevent corrosion damage. Parts which are to be stored should also be wrapped in heavy waxed paper and kept dust-free.

INSPECTION

Prior to reassembly, parts which are to be reused must be carefully inspected for signs of wear or damage. Replacement of such parts can prevent costly downtime at a future date.

All bearing surfaces, including roller bearing cups and cones, should be examined for pitting, wear, or overheating. Gears also may show pits, as well as scoring and broken teeth. Shafts may be nicked or marred, or may have damaged threads. Parts which show any sign of damage should be repaired or replaced.

Inspect the rotor, housing, and idler of the oil pump (if equipped) for scoring. Inspect the drive tab of the rotor assembly. If any damage is noted, the pump cartridge assembly should be replaced as a unit.

Check all shift forks and slots in sliding clutches for wear or discoloration due to heat. Check the engaging teeth for a partial engagement wear pattern.

IV. ASSEMBLY

ASSEMBLY PRECAUTIONS

1. Read the instructions completely before starting reassembly. Refer to the appropriate exploded view in the parts manual.
2. All parts must be clean. The gasket surfaces must be free of old gasket material.
3. Bearing cup bores, shaft spline, and bearing mounting surfaces. should be coated with Lubriplate or equivalent. This is necessary to reduce the possibility of galling.
4. The oil seals should be coated with Loctite 601 or equivalent on their outer diameter prior to being installed in their bores. Their sealing lips should be coated with Lubriplate or equivalent to provide initial lubrication.
5. Any external cap screw not to be installed in a blind hole should have its threads coated with Permatex Form-A-Gasket #2 or equivalent non-hardening sealer to prevent an oil leak.
6. All threaded fasteners should be tightened to the torque specified in the torque chart.
7. Universal joint yokes or companion flanges should be coated with Lubriplate or equivalent on their seal operating area before installation. They should be tightened into place with their locknuts tightened to the proper torque before the shim thickness is determined.
8. In many of the procedures, when a part is assembled with a press fit, it is recommended that the part be heated prior to installation. The part should be placed in an oven and heated to no more than 300° F. Excessive heat may change the metallurgical properties of the part. **Heated components should be allowed to cool to room temperature before end float measurements are made.**

SUBASSEMBLIES

In the assembly procedures that follow, it is assumed that the shaft assembly was completely disassembled. Skip any step that refers to a part that is already assembled.

UPPER SHAFT ASSEMBLY – MODELS WITHOUT PTO OR HYDRAULIC PUMP OUTPUT

Refer to Figure P.5 in the parts manual.

1. Install the shaft key.
2. Heat and install the bearing cone assembly against the shoulder on the non-threaded end of the shaft. See Figure 37.

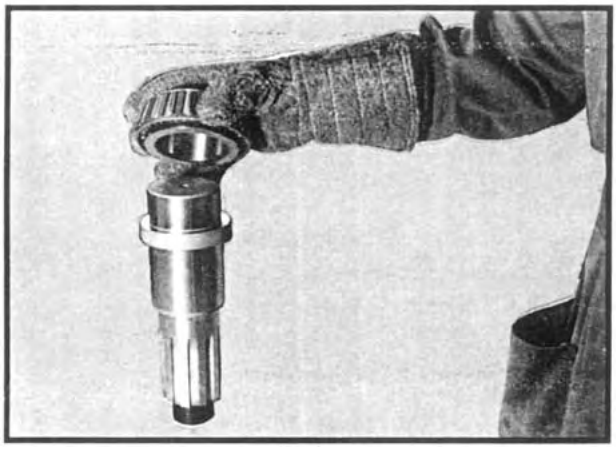

Fig 37

3. Heat and install the gear on the other end of the shaft against the shoulder. slip the spacer washer against the gear. Heat and install the remaining bearing cone assembly on the shaft against the washer.

4. Press the front bearing cup into the carrier and install a new oil seal.

5. Place the carrier into position and slide the yoke (or companion flange) onto the shaft. Install the yoke retaining locknut. For convenience, the nut may be torqued after the shaft assembly has been installed in the transfer case housing.

UPPER SHAFT ASSEMBLY – MODELS WITH PTO OUTPUT

Refer to Figure P.6 in the parts manual.

1. Follow the similar procedure in Steps 1 through 5 under “REAR OUTPUT SHAFT ASSEMBLY – MODELS WITHOUT NEUTRAL” below.

2. To assemble the PTO output shaft assembly, follow the similar procedure under “FRONT OUTPUT SHAFT ASSEMBLY” below.

UPPER SHAFT ASSEMBLY – MODELS WITH HYDRAULIC PUMP OUTPUT

Refer to Figure P.7 in the parts manual.

Follow the similar procedure in Steps 1 through 5 under 'REAR OUTPUT SHAFT ASSEMBLY – MODELS WITHOUT NEUTRAL" below.

INTERMEDIATE SHAFT ASSEMBLY

Refer to Figure P.9 in the parts manual if unit is equipped with a lubrication pump; if not see Figure P.8.

1. Install the shaft key.

2. Heat and install the bearing cone assembly on the end of the shaft closest the the shoulder. See Figure 38.

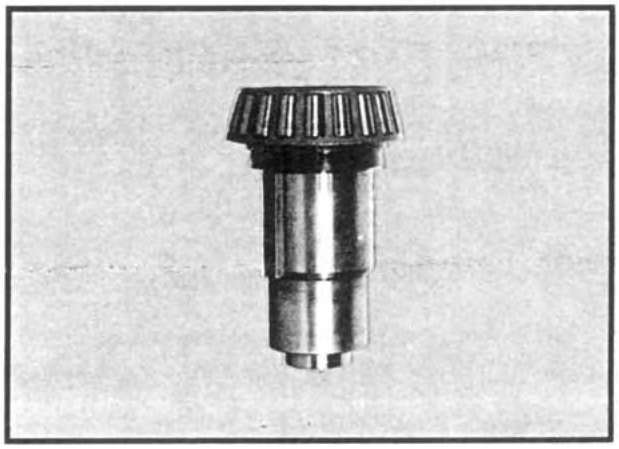

Fig 38

The remainder of the intermediate shaft assembly must be done inside of the transfer case housing during the shaft installation procedure.

FRONT OUTPUT SHAFT ASSEMBLY

Refer to Figure P.10 in the parts manual.

1. Install the snap ring on the shaft.

2. Slide the clutch gear over the shaft such that the counterbore in the gear fits over the snap ring. See Figure 39.

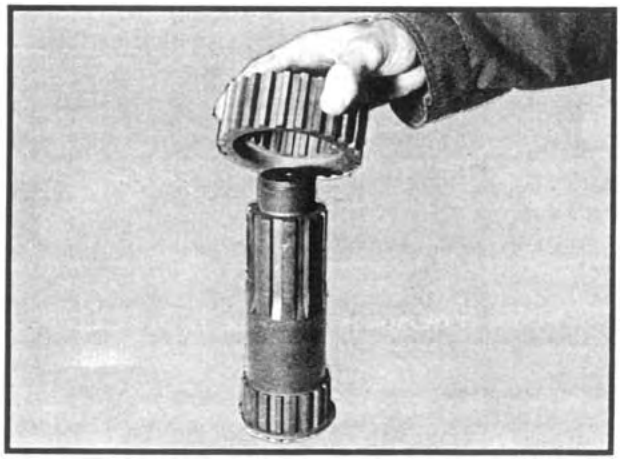

Fig 39

3. Heat and install the bearing cone assembly against the clutch gear. Slide the bearing spacer ring against the bearing cone assembly.

   The bearing cone spacer ring is a select-fit part that is used to adjust the shaft end float. If the end float checked prior to disassembly was within specification (.003 to .008 in.) and no parts were replaced, the original bearing spacer ring should provide the correct end float on reassembly.

4. Press the bearing cups into the carrier and place the carrier assembly into position. Heat and install the remaining bearing cone assembly. See Figure 40. Do not install the oil seal at this time. Slide the yoke (or companion flange) onto the shaft. Install and torque the locknut.

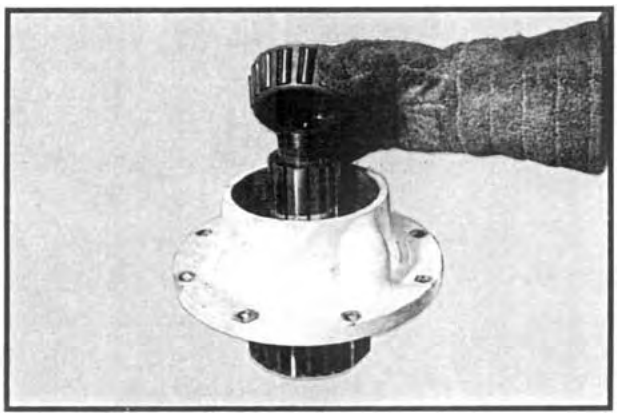

Fig 40

5. Install a dial indicator as depicted in Figure 41. Lift upward on the carrier assembly and note the shaft end float on the dial indicator. If the end float is not within specification (.003 to .008 in.), it will be necessary to disassemble the shaft following Steps 2 and 3 under "FRONT OUTPUT SHAFT DISASSEMBLY" above. Measure the thickness of the original spacer ring and select a new ring to provide end float within specification. See Item 7 on P.10 in the parts manual for a list of available spacer rings. Be sure to recheck the shaft end float after the new spacer ring is installed.

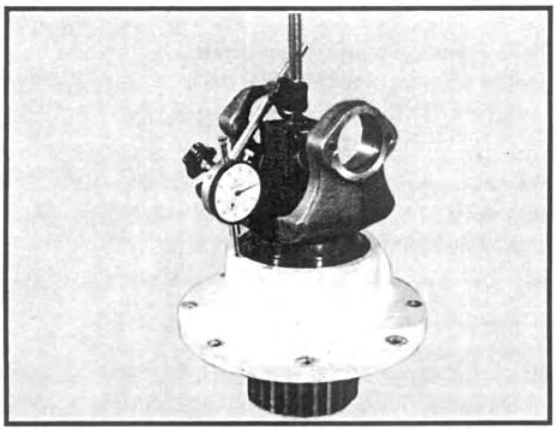

Fig 41

6. After a shaft end float within specification is obtained, remove the yoke (or companion flange) and install a new oil seal. Reinstall the yoke (or flange) and its locknut. Torque to specification.

REAR OUTPUT SHAFT ASSEMBLY – MODELS WITHOUT NEUTRAL

Refer to Figure P.11 in the parts manual.

1. Install the shaft key.

2. Heat and install the bearing cone assembly on the end of the shaft closest to the shoulder. See Figure 42.

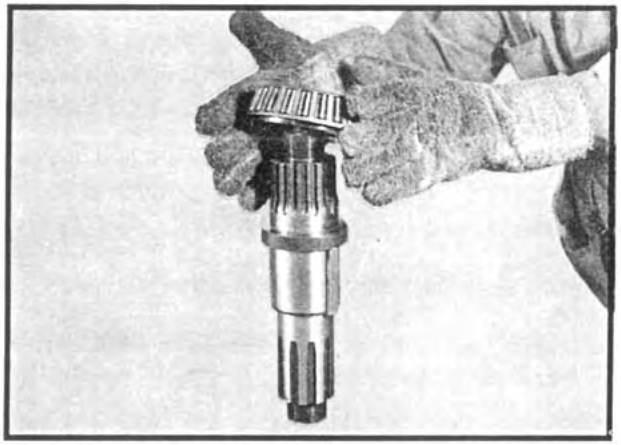

Fig 42

3. Heat and install the gear on the other end of the shaft. See Figure 43. Slip the spacer washer against the gear. Heat and install the remaining bearing cone assembly on the shaft against the washer. Slide the clutch gear into place against the other cone and install the clutch gear retaining locknut. For convenience, the nut may be torqued after the shaft assembly has been installed in the transfer case housing.

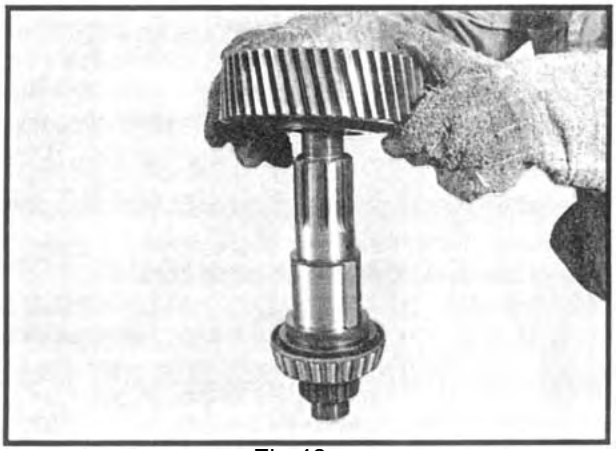

Fig 43

4. Press the front bearing cap into the carrier and install a new oil seal.

5. Place the carrier into position and slide the yoke (or companion flange) onto the shaft. Install the locknut. For convenience, the nut may be torqued after the shaft assembly has been installed in the transfer case housing.

REAR OUTPUT SHAFT ASSEMBLY – MODELS WITH NEUTRAL

Refer to Figure P.12 in the parts manual

1. Slide the thin washer (Item #12, Figure P.12) on the end of the shaft with the 21-tooth spline. Heat and install a gear bearing cone assembly (one of the narrower two) against the washer. Slide the bearing spacer ring against the cone.

   Note that the bearing spacer ring is a select-fit part that is used to adjust the gear end float. If the end float checked prior to disassembly was within specification (.003 to .008 in.) and no parts were replaced, the original bearing spacer ring should provide the correct end float on reassembly.

2. Install the snap ring in the groove of the gear. Press a bearing cup into the end of the gear nearest the snap ring. Note that the cup has a light press fit to the gear. The cup should be snug against the snap ring. Insert the bearing cup spacer from the other end. Press in the remaining bearing cup snug against the spacer. Position the gear assembly onto the shaft. The face of the gear with the internal clutch splines must go toward the shaft shoulder.

3. Heat and install the remaining gear bearing cone assembly. Slide the spacer ring (Item #5, Figure P.12) over the shaft against the bearing cone.

4. Heat and install the shaft bearing cone assembly against the spacer ring. Slip the clutch gear into place against the bearing cone. Install and torque the clutch gear retaining locknut to specification. For convenience, the clutch collar may be engaged with the internal splines of the gear to lock the shaft to the gear.

5. Install a dial indicator as depicted in Figure 44. Lift upward on the gear assembly and note the gear end float on the dial indicator. If the end float is not within specification (.003 to .008 in.) it will be necessary to disassemble the shaft by performing Steps 7 and 8 under “REAR OUTPUT SHAFT DISASSEMBLY – MODELS WITH NEUTRAL”. Measure the thickness of the original spacer ring and select a new ring to provide end float within specification. See item 11 on P.12 in the parts manual for a list of available spacer rings. Be sure to recheck the gear end float after a new spacer ring is installed.

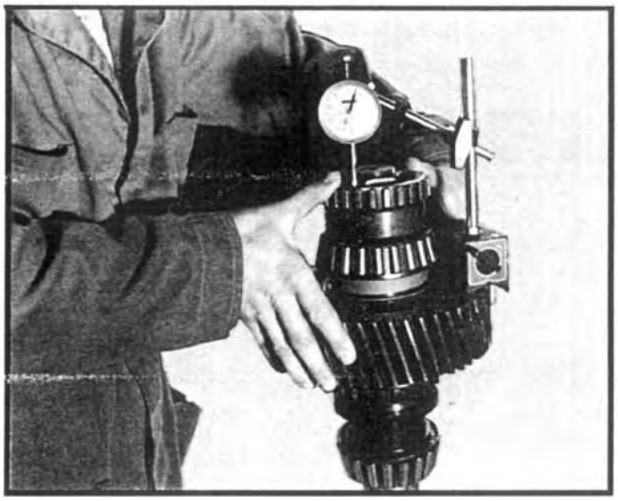

Fig 44

6. Slide the clutch collar into engagement with the gear internal splines. Slip the inner ring (Item #15, Figure P.12) into position against the splines closest the middle of the shaft. Heat and install the remaining bearing cone assembly against the ring. Slip the outer ring (Item #18, Figure P.12) into position against the bearing cone.

7. Press the bearing cup into the carrier and install a new oil seal. Install a new shifter shaft O-ring into its groove in the carrier.

8. Assemble the shifter shaft to the shift fork and install the locknut and washer. Slip the shift fork into the groove in the clutch collar and place the carrier assembly into position over both shafts.

9. Install the piston-to-shaft O-ring over the threaded portion of the shifter shaft. Insert one of the nylon piston stop rings into the cylinder bore.

10. Install the piston O-ring in the deeper groove in the piston. Soak the air shift piston felt strip in gear oil and install in the other groove. Insert the piston into its bore. The end of the piston with the felt strip must go in first. Install the shifter shaft washer and nut over the piston. Insert the remaining nylon piston stop ring into the cylinder bore.

11. Install a new O-ring on the shift cylinder cap. Install the cap and torque the (4) cap screws.

12. Slide the yoke (or companion flange) onto the shaft and install the locknut for convenience, the nut may be torqued after the shaft assembly has been installed in the transfer case housing.

LOWER SHAFT ASSEMBLY – MODELS WITH 33/67 PROPORTIONAL DIFFERENTIAL

Refer to Figure P.13 in the parts manual.

1. Heat the rear bearing cone assembly and install on the rear differential case half.

2. Place the large gear into position on the front differential case half. It may be desirable to heat the gear slightly. Allow the gear to cool completely, and install the (8) gear retaining lock nuts. Torque to specification. Heat and install the front bearing cone assembly against the shoulder on the case.

3. slide the clutch gear into place against the bearing cone. Install the clutch gear retaining locknut using Fabco Tool 866-0368 or equivalent. See Figure 45. Torque to specification.

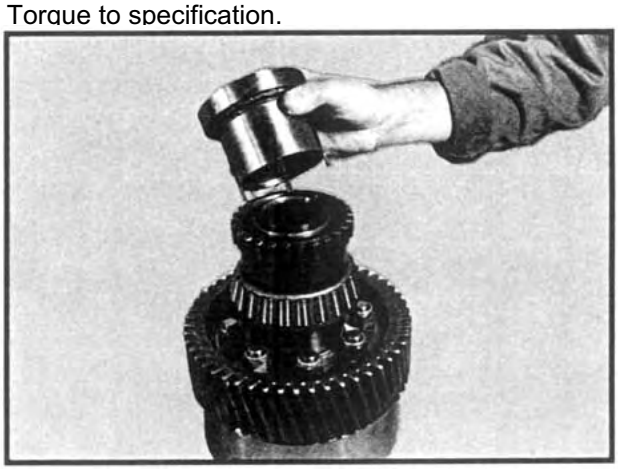

Fig 45

4. Guide the sun gear (front output shaft) into the planet gear carrier. Place the (4) planet gears into position in the carrier. The chamfered face of the cover should face away from the carrier. Install the (4) allen-head shoulder screws and torque to specification.

5. Make sure that the two dowel pins are in place inside the front differential case. Guide the planet carrier assembly into the front differential case assembly engaging the dowel pins. See Figure 46. Note that it is critical to the operation of the differential assembly that there be no nicks, burrs, or foreign matter between the two assemblies which would interfere with the proper seating of the carrier. Install the (6) 12-point cap screws to secure the planet carrier assembly in place. Tighten a crisscross pattern and torque to specification.

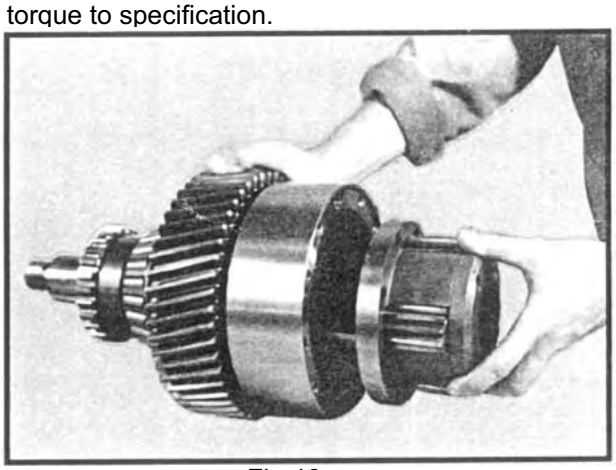

Fig 46

6. Install the internal gear over the planet gears and place the thrust washer on the gear. See Figure 47.

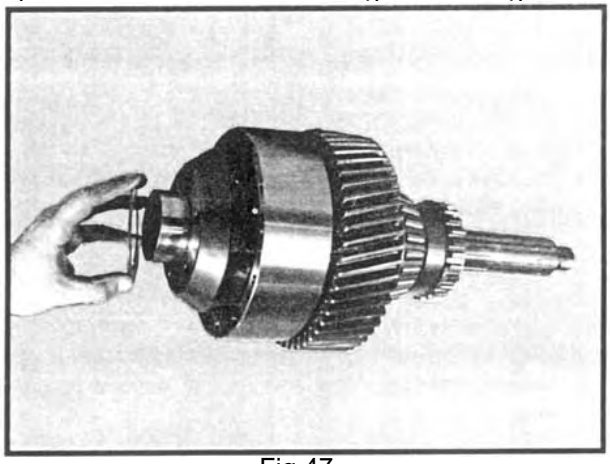

Fig 47

7. Assemble the two differential case halves together and install the (12) bolts. Torque to specification.

8. Install the retaining ring on the front output shaft. See Figure 48.

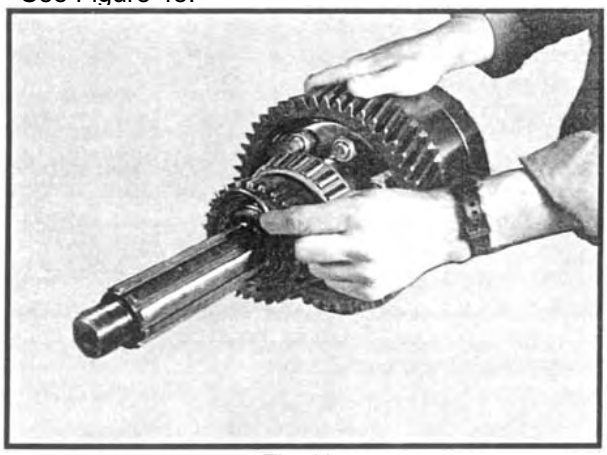

Fig 48

The assembly procedure for the rear output shaft assembly follows.

9. Press the bearing cups into the carrier.

10. Heat one of the bearing cone assemblies and install on the rear output shaft against the shoulder. Slide the bearing spacer ring against the bearing cone.

The bearing spacer ring is a select-fit part that is used to adjust the shaft end float. If the end float check prior to disassembly was within specification (.003 to .008 in) and no parts were replaced, the original ring should provide the correct end float on reassembly.

11. Place the carrier assembly into position. Heat and install the remaining bearing cone assembly. Do not install the oil seal at this time.

12. Slip the yoke (or companion flange) into place. Install the locknut and torque to specification.

13. Install a dial indicator with a magnetic base as depicted in Figure 49. Lift upward on the carrier assembly and not the shaft end float on the dial indicator. If the end float is not within specification (.003 to .008 in.), it will be necessary to disassemble the shaft by performing Steps 10 and 11 under "LOWER SHAFT DISASSEMBLY – MODELS WITH 33/67 PROPORTIONAL DIFFERENTIAL". Measure the thickness of the original spacer ring and select a new ring to provide end float within specification. See Item 41 on P.13 in the parts manual for a list of available spacer rings. Be sure to check the shaft end float after a new spacer ring is installed.

Fig 49

14. After a shaft end float within specification is obtained. remove the yoke (or companion flange) and install a new oil seal. Reinstall the yoke (or flange) and its locknut. Torque to specification.

15. Install the carrier assembly to the outer differential housing using a new gasket. Note that the flush face of the housing fits against the carrier. Install the (10) cap screws and washers. Torque to specification.

LOWER SHAFT ASSEMBLY – MODELS WITH 50/50 PROPORTIONAL DIFFERENTIAL

Refer to Figure P.14 in the parts manual.

1. heat the rear bearing cone assembly and install on the rear differential case half.

2. Place the large gear into position on the front differential case half. It may be desirable to heat the gear slightly. Allow the gear to cool completely and install the (8) gear retaining locknuts. Torque to specification. Heat and install the front bearing cone assembly against the shoulder of the case.

3. slide the clutch gear into place against the bearing cone. Install the clutch gear retaining locknut using Fabco Tool 866-0368 or equivalent. See Figure 50. Torque to specification.

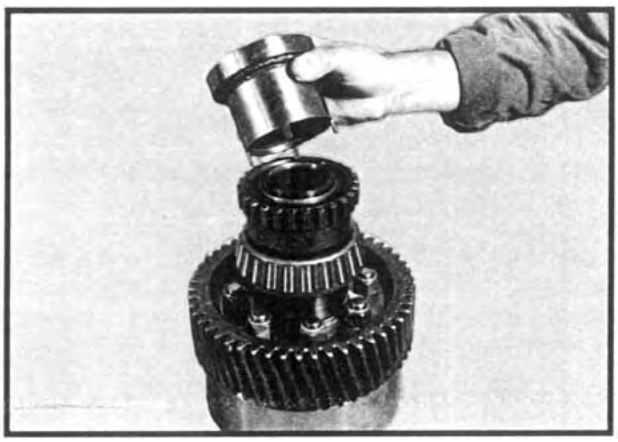

Fig 50

4. Place a thrust washer onto one of the differential side gears and insert into the front differential carrier half. See Figure 51.

Fig 51

5. Assemble the (4) differential pinion gears and their thrust washers onto the differential spider cross and place into the front differential case half. See Figure 52

Fig 52

6. Place a thrust washer onto the remaining side gear and place into position against the pinion gears. Assemble the two differential case halves together. Install the (12) bolts and torque to specification.

7. To assemble the rear output shaft assembly, follow Steps 9 through 14 under "LOWER SHAFT ASSEMBLY – MODELS WITH 33/67 PROPORTIONAL DIFFERENTIAL" above.

V. TRANSFER CASE COMPONENT INSTALLATION

INTERMEDIATE SHAFT INSTALLATION

If the unit is equipped with a lubrication pump, refer to Figure P.9 in the parts manual. If not, refer to Figure P.8.

1. Position the transfer case with its front end (nameplate) facing upward.

2. Heat the intermediate shaft gear and lower it into the transfer case housing through the upper shaft bore. Position the gear against the rear of the housing in line with the intermediate shaft bores. See Figure 53. Quickly lower the intermediate shaft assembly through the gear. Be sure that the gear is firmly seated against the shaft shoulder.

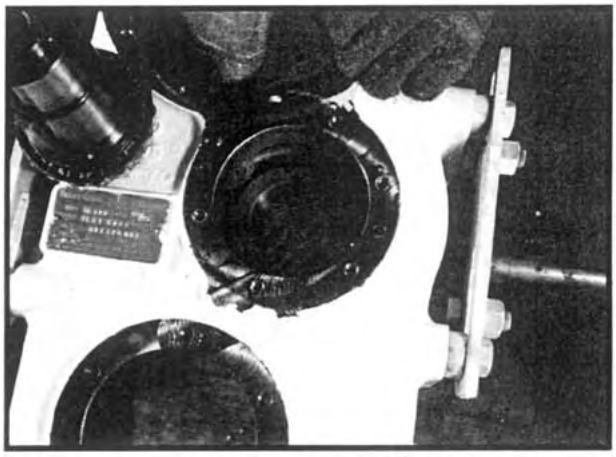

Fig 53

3. Place one of the bearing cups into its bore in the front of the housing. Install the front intermediate shaft cap with a new gasket. Install the (6) cap screws and washers. Torque to specification.

4. Rotate the transfer case over so that its rear end is facing upward. To prevent damage, reach in the case and support the intermediate shaft assembly as the unit is rotated.

5. Slip the spacer washer over the intermediate shaft against the gear. Heat and install the remaining bearing cone assembly against the spacer washer. See Figure 54.

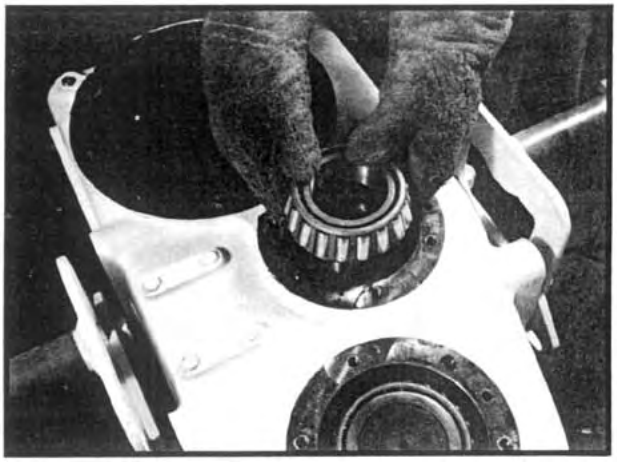

Fig 54

6. Place the bearing cup into its bore. Install the rear cap with the original shim pack. Install the (6) cap screws and washers. Torque to specification.

7. If the unit is equipped with a lubrication pump, mount a dial indicator such that the indicator tip rests against the end of the shaft. See Figure 55.

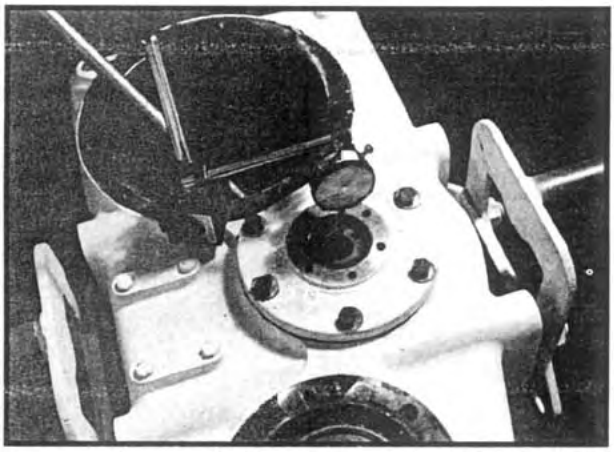

Fig 55

If the unit has a solid cap (no lubrication pump), the dial indicator should be mounted so that its tip rests against the rear face of the intermediate shaft gear. See Figure 56.

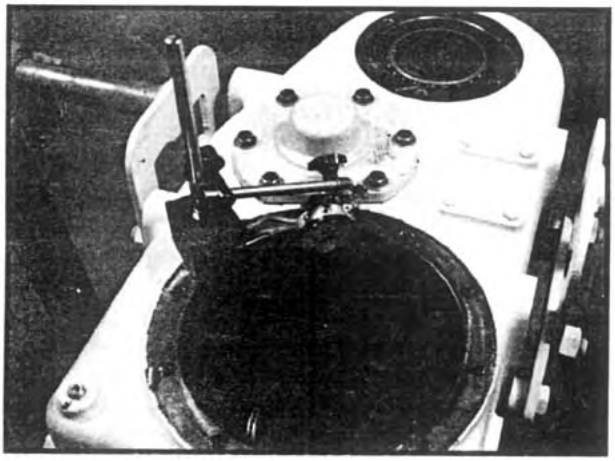

Fig 56

Pry the gear up and down several times to be sure that the bearing cups are seated. Note the indicated shaft end float on the dial indicator. If the end float is not within specification (.003 to .008 in.), the shim pack should be removed and replaced with a combination of shims which will provide the proper end float. See Item 10 on P.8 in the parts manual for a list of available shims. Be sure to recheck the end float afterwards.

If the unit is not equipped with a lubrication pump, the intermediate shaft installation is complete. The steps that follow are only for units with a lubrication pump.

8. Insert the oil pump spring into the shaft counterbore. Be sure to insert the end of the spring with the long metal shell into the shaft first.

9. Assemble the pump cartridge (Item 13) as shown in Figure P.9 in the parts manual. Install the cartridge over the intermediate shaft such that the tang of the cartridge shell engages with the slot in the shaft.

10. Place the oil pump ring into position over a new gasket.

11. The amount that the oil pump spring is compressed is set by the number of shims used between the pump cap and ring. The correct amount of spring compression is between .040 and .080 inches.

Measure the gap between the pump cap and ring as the cap is held against the cartridge lightly so as not to compress the spring. Subtract .060 from this measurement and choose the number of shims that will come closest to this figure. Note that each shim is .031 inches thick.

Place the correct number of shims over the ring and install the pump cap. Make sure that the shaft is positioned so that the pin protruding from the cap fits into the semicircular depression in the end of the pump cartridge. Install the (6) cap screws and washers. Torque to specification.

REAR OUTPUT SHAFT INSTALLATION

Refer to Figure P.12 if the unit has provisions for neutral, Figure P.11 if not. See Figure P.10 also.

1. Position the transfer case with its front end (nameplate) facing upward.

2. If removed, install the expansion plug into the shifter shaft bore of the front declutch housing. Use non-hardening sealer to prevent an oil leak.

3. Insert the front bearing cup into its bore. Using the original shim pack, position the front declutch housing on the transfer case such that the shifter shaft bores are directly to the left of the lower shaft bore (as viewed when the unit is installed in the vehicle). See Figure 57. Install the (6) 12-point cap screws and torque to specification.

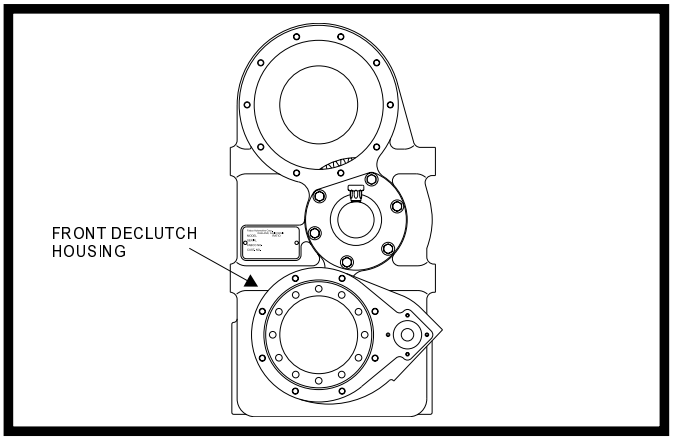

Fig 57

4. Rotate the transfers case over so that its rear end is facing upward.

5. Make sure that the front bearing cup is still in place. Position a new gasket on the transfers case housing and lower the rear output shaft assembly into place. The work “TOP” on the carrier must be toward the top of the transfer case as installed in the vehicle. Install the (10) cap screws and washers to secure the carrier to the transfer case housing. Torque to specification.

6. If not done so already, torque both the yoke (or flange) and the clutch gear retaining locknuts.

7. Mount a dial indicator on the shaft as shown in Figure 58. Pry the rear output shaft up and down several times to be sure that the front bearing cup is seated. Note the indicated shaft end float on the dial indicator. If the end float is not within specification (.003 to .008 in.), the shim pack should be removed and replaced with a combination of shims which will provide the specified end float. See Item 16 on P.10 in the parts manual for a list of available shims. Be sure to recheck the end float afterwards.

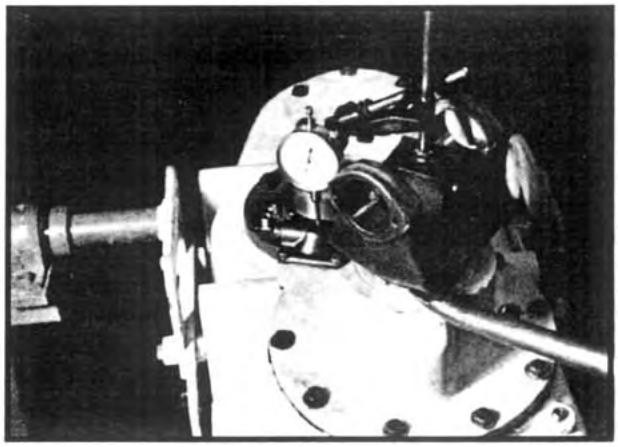
Fig 58

LOWER SHAFT INSTALLATION – MODELS WITH PROPORTIONAL DIFFERENTIAL

Refer to Figure P.13 in the parts manual if unit is equipped with a 33/67 proportional differential, Figure P.14 if 50/50. Refer to Figure P.15 for the air shift cylinder details.

1. Position the transfer case with its front end (nameplate) facing upward.

2. If removed, install the expansion plug into the shifter shaft bore of the differential lockout housing. Use non-hardening sealer to prevent an oil leak.

3. Insert the front bearing cup into its bore. Using the original shim pack, position the P.D. lockout housing on the transfer case such that the shifter shaft bores are directly to the left of the lower shaft bore (as viewed when the unit is installed in the vehicle). See Figure 59. Install the (6) 12-point cap screws and torque to specification.

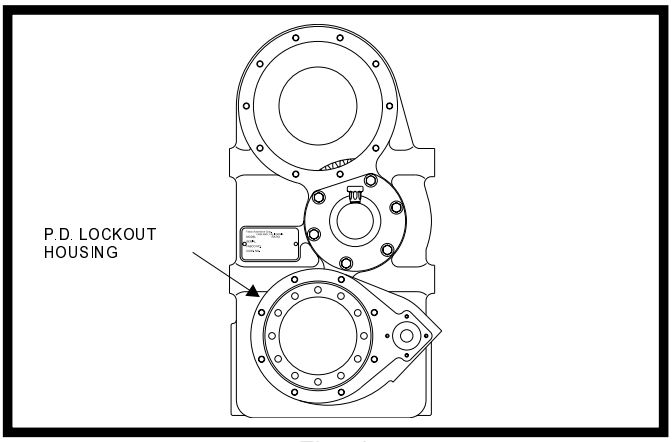

Fig 59

4. Rotate the transfer case over so that its rear end is facing upward.

5. Make sure that the front bearing cup is still in place. Lower the lower shaft assembly into place. See Figure 60.

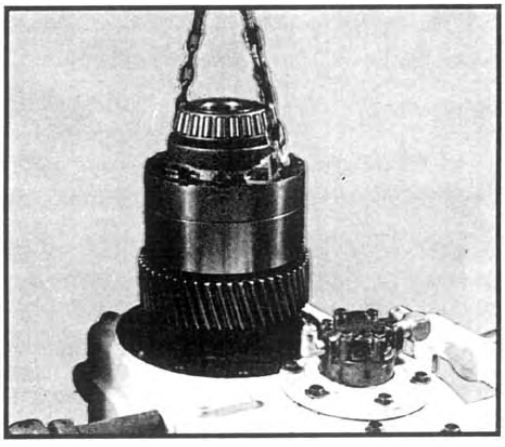

Fig 60

6. Lower the rear output shaft assembly into position with a new gasket. The work "TOP" on the rear carrier must be toward the top of the transfer case as installed in the vehicle. Torque the (10) 12-point cap screws to specification.

7. Rotate the transfer case over so that its front end is facing upward.

8. Install a dial indicator such that the indicator tip rests against the end of the clutch gear as shown in Figure 61. Pry the lower shaft assembly up and down several times to be sure that the front bearing cup is seated. The prying must be done on the clutch gear, not at the rear output shaft. Note the indicated shaft end float. If the end float is not within specification (.003 to .008 in.), the shim pack should be removed and replaced with a combination of shims which will provide the specified end float. See Item 16 on P.13 or 14 in the parts manual for a list of available shims. Be sure to recheck the end float afterwards.

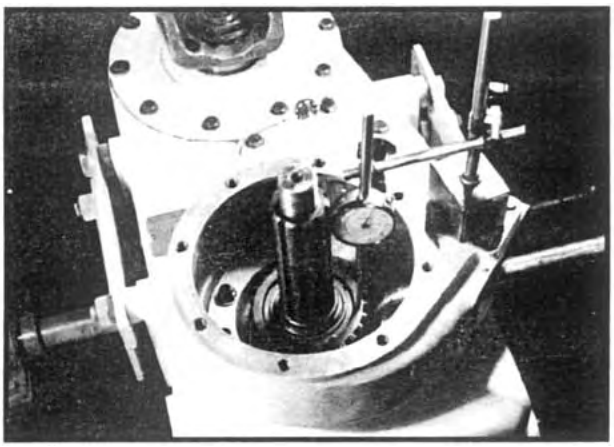

Fig 61

9. On models with the 50/50 proportional differential only. Insert the front output shaft.

10. To install the air shift cylinder parts, follow the similar procedure in Steps 2 through 9 under "FRONT OUTPUT SHAFT INSTALLATION" below.

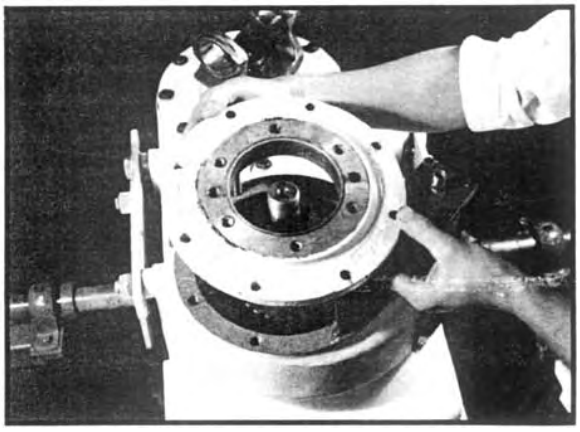

Fig 62

11. Install the front bearing carrier using a new gasket. See Figure 62. Be sure that the work “TOP” is toward the top of the transfer case as installed in the vehicle. Install the (8) cap screws and washers and torque to specification.

12. slip the ball bearing assembly into position with the snap ring end outward. Tap gently on its outer race if necessary.

13. Install a new oil seal into the seal carrier and install to the bearing carrier using a new gasket. The two slots in the rear face of the seal carrier must lineup with the two non-tapered holes in the bearing carrier.

14. Install the front output yoke (or companion flange) and its retaining washer and locknut. Torque to specification.

FRONT OUTPUT SHAFT INSTALLATION

Refer to Figures P.10 and P.15 in the parts manual

1. Position the transfer case with its front end upward. The front declutch housing should already be installed. The front declutch housing should already be installed. See “REAR OUTPUT SHAFT INSTALLATION” above.

2. Slide the shift fork onto the clutch collar and place the two parts as a unit into the declutch housing. The clutch collar must be installed in the direction as indicated in Figure P.10 in the parts manual. See Figure 63.

3. Insert the shift shaft into position. Rotate the shaft so that the slots lineup with the bolt holes in the shift fork. Install the two shift fork bolts and torque to specification. Install the lock wire between the two bolt heads. See Figure 63.

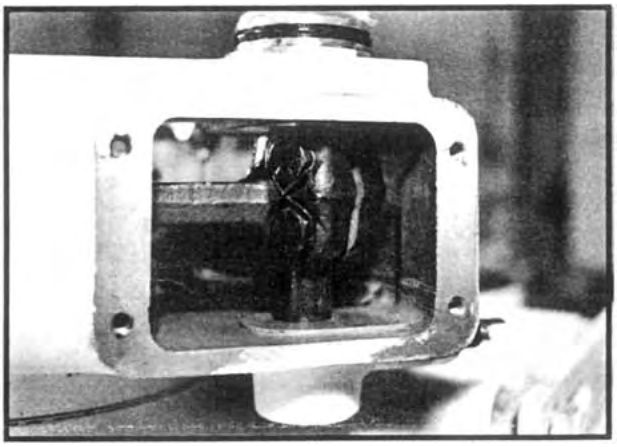

Fig 63

4. Install two new O-rings on the shift cylinder adapter tube and push into the front declutch housing. The end of the tube with the counterbore must face outward.

5. Install a new piston-to-shaft O-ring over the threaded portion of the shaft. Slide the spring over the shaft. Place the nylon stop ring over the shaft and spring.

6. Install a new piston O-ring in the deeper groove in the piston. Soak the air shift piston felt strip in gear oil and install in the other groove. Position the piston on the shifter shaft. The end of the piston with the counterbore should be facing outward. Push the piston down to compress the spring and install the shifter shaft washer and locknut. Torque the nut to specification.

7. Install the declutch housing cover with a new gasket. See Figure 64. Torque the (4) cap screws to specification.

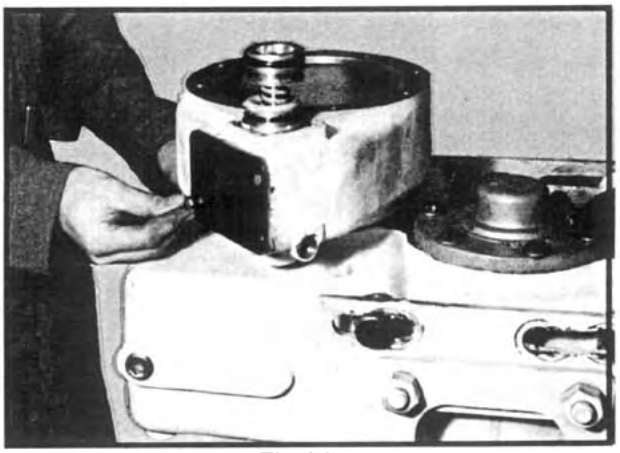

Fig 64

8. Slip the air shift cylinder into position over the piston. Install a new O-ring on the shift cylinder cap and insert into the cylinder. Secure the assembly with the (4) long cap screws. Torque to specification.

9. Insert the indicator switch actuating pin into place. The rounded end of the pin must face inward. Install the switch using a new copper washer. Torque to specification.

10. Using a new gasket, install the front output shaft assembly to the declutch housing. See Figure 65. The oil drain-back passage in the carrier must be toward the bottom of the transfer case as installed in the vehicle. Install the (8) cap screws and washers and torque to specification.

Fig 65

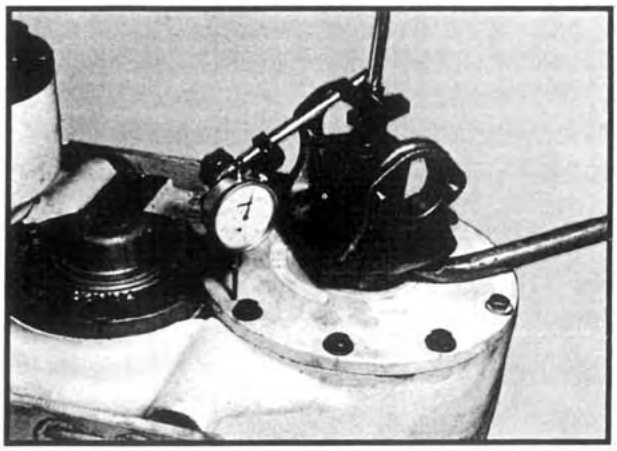

Fig 66

UPPER SHAFT INSTALLATION – MODELS WITHOUT PTO OR HYDRAULIC PUMP OUTPUT

Refer to Figure P.5 in the parts manual.

1. Position the transfer case with its rear end facing upward.

2. Insert the rear bearing cup into its bore. Using the original shim pack, install the rear cap to the transfer case housing. The two slots in the carrier must lineup with the two non-tapped holes in the housing. Secure with the (6) cap screws and washers. Torque to specification.

3. Rotate the transfer case over so that its front end is facing upward.

4. Make sure that the rear bearing cup is still in place. Position a new gasket on the transfer case housing and lower the upper shaft assembly into place. The work “TOP” on the carrier must be toward the top of the transfer case as installed in the vehicle. Install the (10) cap screws and washers. Torque to specification.

5. Mount a dial indicator on the shaft as shown in Figure 66. Pry the shaft up and down several times to be sure that the rear bearing cup is seated. Note the indicated shaft end float on the dial indicator. If the end float is not within specification (.003 to. 008 in.), the shim pack should be removed and replaced with a combination of shims which will provide the specified end float. See item 13 on P.5 in the parts manual for a list of available shims. Be sure to recheck the end float afterwards.

UPPER SHAFT INSTALLATION – MODELS WITH PTO OUTPUT

Refer to Figure P.6 and P.15 in the parts manual.

1. Position the transfer case with its rear end facing upward.

2. If removed install the expansion plug into the shifter shaft bore of the declutch housing. Use non-hardening sealer to prevent an oil leak.

3. Insert the rear bearing cup into its bore. Using the original shim pack, position the PTO declutch housing on the transfer case such that the shifter shaft bores are directly to the left of the upper shaft bore (as viewed when the unit is installed in the vehicle). See Figure 67. Install the (6) 12-point cap screws and torque to specification.

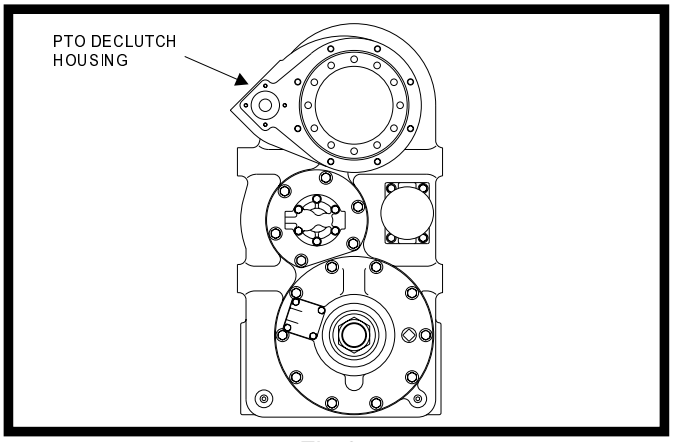

Fig 67

4. Follow the similar procedure in Steps 3 through 5 under “UPPER SHAFT INSTALLATION – MODELS WITHOUT PTO OR HYDRAULIC PUMP OUTPUT” above.

5. To install the PTO shaft and air shift components, follow the similar procedure in Steps 2 through 10 under “FRONT OUTPUT SHAFT INSTALLATION” above.

UPPER SHAFT INSTALLATION – MODELS WITH HYDRAULIC PUMP OUTPUT

Refer to Figures P.7 and P.15 in the parts manual.

1. Position the transfer case with its rear end upward.
2. If removed, install the expansion plug into the shifter shaft bore of the declutch housing. use non-hardening sealer to prevent an oil leak.
3. Insert the rear bearing cup into its bore. Using the original shim pack, position the PTO declutch housing on the transfer case such that the shifter shaft bores are directly to the left of the upper shaft bore (as viewed when the unit is installed in the vehicle). See Figure 67 above. Install the (6) 12-point cap screws and torque to specification.
4. Follow the similar procedure in Steps 3 through 5 under "UPPER SHAFT INSTALLATION – MODELS WITHOUT PTO OR HYDRAULIC PUMP OUTPUT" above.
5. To install the air shift components, follow the similar procedure in Steps 2 through 9 under "FRONT OUTPUT SHAFT INSTALLATION" above.
6. Mount the hydraulic pump to the pump mounting plate. Note that the lubrication fitting hole in the plate must be on top when mounted to the transfer case as installed in the vehicle. To prevent an oil leak, use a thin film of anaerobic sealing compound (Loctite 504 "Gasket Eliminator" or equivalent) between the pump and the plate. Tighten the (4) mounting bolt nuts to specification.
7. Install the pump drive gear on the pump shaft. See Figure 68 for correct positioning. Tighten the two set screws to specification.

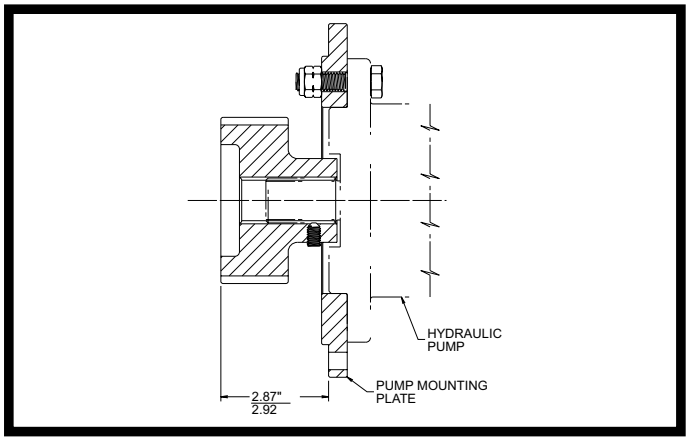

Fig 68

8. Place a new gasket on the declutch housing and assemble to hydraulic pump and mounting plate assembly to the declutch housing. The lubrication fitting hole in the pump mounting plate should be toward the top of the transfer case as installed in the vehicle. Install the (8) cap screws and washers. Torque to specification.

NOTES

VI. TORQUE SPECIFICATIONS

DESCRIPTION	SIZE	TORQUE (LB-FT)
A. Upper Shaft		
Front Carrier to Housing	7/16-14	45
Rear Cap to Housing	7/16-14	45
Declutch Housing to Main Housing	7/16-14	20
PTO Carrier to Declutch Housing	7/16-14	35
Cover Plate to Declutch Housing	1/4-20	7
Hydraulic Pump Mounting Plate to Declutch Housing	7/16-14	35
Hydraulic Pump to Mounting Plate Locknut	1/2-13	60
Front Yoke/Flange Retaining Locknut	1 3/4-12	600
Clutch Gear Retaining Locknut	1 3/4-12	600
PTO Yoke/Flange Retaining Locknut	1 1/2-12	500
Hydraulic Pump Drive Gear Set Screws	3/8-16	50
B. Intermediate shaft		
Front/Rear Cap	7/16-14	45
Oil Pump Cap	5/16-24	15
C. Front Output Shaft		
Declutch Housing to Main Housing	7/16-14	20
Carrier to Declutch Housing	7/16-14	35
Cover Plate to Declutch Housing	1/4-20	7
Yoke/Flange Retaining Locknut	1 3/4-12	600
D. Rear Output Shaft		
Rear Carrier	7/16-14	45
Shift Cylinder Cap	1/4-20	15
Clutch Gear Retaining Locknut	1 3/4-12	600
Yoke/Flange Retaining Locknut	1 3/4-12	600
Shift Fork to Shaft Locknut	1/2-20	60
Air Shift Piston to Shaft	3/8-24	25
E. Lower shaft (Proportional Differential)		
Lockout Housing to Main Housing	7/16-14	20
Bearing Carrier to Lockout Housing	7/16-14	35
Seal Carrier to Bearing Carrier	7/16-14	35
Cover Plate to Declutch Housing	1/4-20	7
Rear Carrier to P.D. Housing	7/16-14	35
P.D. Housing to Main Housing	7/16-14	20
Front Yoke/Flange Retaining Locknut	1 1/4-12	400
Rear Yoke/Flange Retaining Locknut	1 3/4-12	600
Clutch Gear Retaining Locknut	2.548-18	150
Gear to Front Differential Case Half Locknut	5/8-18	120
Differential Case Half Bolts	1/2-13	90
Planet Gear Carrier to Front Differential Case Half (33/67 P.D.)	3/8-16	40
Planet Gear Carrier Cover Plate to Carrier (33/67 P.D.)	3/8-16	40
F. Air shift Cylinder Assembly		
Shift Cylinder Cap	1/4-20	15
Piston to Shaft Locknut	3/8-24	25
Shift Fork Clamp Bolts	7/16-20	40
Indicator Switch	9/16-18	25